ClinicalEvidence

Shoulder pain

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ABSTRACT

INTRODUCTION: Shoulder pain is a common problem with an estimated prevalence of 4% to 26%. About 1% of adults aged over 45 years consult their GP with a new presentation of shoulder pain every year in the UK. The aetiology of shoulder pain is diverse and includes pathology originating from the neck, glenohumeral joint, acromioclavicular joint, rotator cuff, and other soft tissues around the shoulder girdle. The most common source of shoulder pain is the rotator cuff, accounting for over two-thirds of cases. METHODS AND OUTCOMES: We conducted a systematic review and aimed to answer the following clinical questions: What are the effects of oral drug treatment, topical drug treatment, local injections, non-drug treatment, and surgical treatment? We searched: Medline, Embase, The Cochrane Library, and other important databases up to August 2009 (Clinical Evidence reviews are updated periodically, please check our website for the most up-to-date version of this review). We included harms alerts from relevant organisations such as the US Food and Drug Administration (FDA) and the UK Medicines and Healthcare products Regulatory Agency (MHRA). RESULTS: We found 71 systematic reviews, RCTs, or observational studies that met our inclusion criteria. We performed a GRADE evaluation of the quality of evidence for interventions. CONCLUSIONS: In this systematic review we present information relating to the effectiveness and safety of the following interventions: acupuncture, arthroscopic subacromial decompression, autologous whole blood injection, corticosteroids (oral, subacromial injection, or intra-articular injection), electrical stimulation, excision of distal clavicle, extracorporeal shock wave therapy, ice, laser treatment, manipulation under anaesthesia, suprascapular nerve block, non-steroidal anti-inflammatory drugs (oral, topical or intra-articular injection), opioid analgesics, paracetamol, physiotherapy (manual treatment, exercises), platelet-rich plasma injection, rotator cuff repair, shoulder arthroplasty, and ultrasound.

INTERVENTIONS

Key points

- Shoulder pain encompasses a diverse array of pathologies and can affect as many as one quarter of the population depending on age and risk factors.

    Shoulder pain may be due to problems with the neck, glenohumeral joint, acromioclavicular joint, rotator cuff, or other soft tissues around the shoulder.

- Rotator cuff problems are the most common source of shoulder pain, accounting for more than two-thirds of cases.

    Rotator cuff disorders are associated with musculoskeletal problems that affect the joints and muscles of the shoulder, cuff degeneration due to ageing and ischaemia, and overloading of the shoulder.

- Frozen shoulder (adhesive capsulitis) accounts for 2% of cases of shoulder pain.

    Risk factors for frozen shoulder include female sex, older age, shoulder trauma and surgery, diabetes, and cardiovascular, cerebrovascular, and thyroid disease.

- In many people, the cornerstone of treatment is achieving pain control to permit a return to normal functional use of the shoulder and encourage this with manual exercises. In people with acute post-traumatic tear, an early surgical option is warranted.

- We don't know whether topical NSAIDs, oral corticosteroids, oral paracetamol, or opioid analgesics improve shoulder pain, although oral NSAIDs may be effective in the short term in people with acute tendonitis/subacromial bursitis. If pain control fails, the diagnosis should be reviewed and other interventions considered.

- Physiotherapy may improve pain and function in people with mixed shoulder disorders compared with placebo.

- Intra-articular corticosteroid injections may reduce pain in the short term compared with physiotherapy and placebo for people with frozen shoulder, but their benefit in the long term and when compared with local anaesthetic is unclear.

- Platelet-rich plasma injections may improve the speed of recovery in terms of pain and function in people having open subacromial decompression for rotator cuff impingement, but further evidence is needed.

- Acupuncture may not improve pain or function in people with rotator cuff impingement compared with placebo or ultrasound.

- Extracorporeal shock wave therapy may improve pain in calcific tendonitis.

- We found some evidence that suprascapular nerve block, laser treatment, and arthroscopic subacromial decompression may be effective in some people with shoulder pain.

- We don't know whether autologous blood injections, intra-articular NSAID injections, subacromial corticosteroid injections, electrical stimulation, ice, ultrasound, rotator cuff repair, manipulation under anaesthesia, or shoulder arthroplasty are effective as we found insufficient evidence on their effects.

DEFINITION   Shoulder pain arises in or around the shoulder from its joints and surrounding soft tissues. Joints include the glenohumeral, acromioclavicular, and sternoclavicular joints. Bursae and motion planes include the subacromial bursa and scapulothoracic plane. Regardless of the disorder, pain is the most common reason for consulting a practitioner. In frozen shoulder (adhesive capsulitis), pain is associated with pronounced restriction of movement. Rotator cuff disorders may affect one or more portions of the rotator cuff and can be further defined as subacromial impingement (rotator cuff tendonitis), rotator cuff tear (partial/full thickness), or calcific tendonitis. A subacromial/subdeltoid bursitis may be associated with any of these disorders, or may occur in isolation. Post-stroke shoulder pain and pain referred from the cervical spine are not addressed in this review. When selecting treatment options for shoulder pain a diagnosis of the specific pathology is rarely necessary. The most useful aspect of diagnosis is to define the source of pain as originating from the cervical spine, glenohumeral joint, rotator cuff, or acromioclavicular joint. A simple algorithm incorporating identification of red flag symptoms and signs, questions in the history, and simple shoulder tests can be followed to locate the source of the shoulder pain. [1]

INCIDENCE/ PREVALENCE   Each year in primary care in the UK, about 1% of adults aged over 45 years present with a new episode of shoulder pain. [2] Prevalence is uncertain, with estimates from 4% to 26%. [3] [4] [5] [6] [7] [8] One community survey (392 people) in the UK found a 1-month prevalence of shoulder pain of 34%. [9] A second survey (644 people aged at least 70 years), in a community-based rheumatology clinic in the UK, reported a point prevalence of 21%, with a higher frequency in women than men (25% in women v 17% in men). [10] Seventy percent of cases involved the rotator cuff. Further analysis of 134 people included in the survey found that 65% of cases were rotator cuff lesions, 11% were caused by localised tenderness in the pericapsular musculature, 10% involved acromioclavicular joint pain, 3% involved glenohumeral joint arthritis, and 5% were referred pain from the neck. [11] Another survey in Sweden found that, in adults, the annual incidence of frozen shoulder was about 2%, with those aged 40 to 70 years most commonly affected. [12]

AETIOLOGY/ RISK FACTORS	Rotator cuff disorders are associated with excessive overloading, instability of the glenohumeral and acromioclavicular joints, muscle imbalance, adverse anatomical features (narrow coracoacromial arch and a hooked acromion), rotator cuff degeneration with ageing, ischaemia, and musculoskeletal diseases that result in wasting of the cuff muscles. [13] [14] [15] [16] Risk factors for frozen shoulder (adhesive capsulitis) include female sex, older age, shoulder trauma, surgery, diabetes, cardiorespiratory disorders, cerebrovascular events, thyroid disease, and hemiplegia. [12] [17] [18] Arthritis of the glenohumeral joint can occur in numerous forms, including primary and secondary osteoarthritis, rheumatoid arthritis, and crystal arthritides. [13] Shoulder pain can also be referred from other sites, in particular the cervical spine. It can also arise after stroke. Post-stroke shoulder pain and referred pain are not addressed in this review.
PROGNOSIS	One survey in community of older people found that most people with shoulder pain were still affected 3 years after the initial survey. [19] One prospective cohort study of 122 adults in primary care found that 25% of people with shoulder pain reported previous episodes and 49% reported full recovery at 18 months' follow-up. [20]
AIMS OF INTERVENTION	To reduce pain and to improve range of movement and function, with minimal adverse effects.
OUTCOMES	**Symptom improvement:** pain scores (overall score, on activity, at night, at rest, during the day, analgesia count); range of movement measures; assessment of overall severity (self assessed or by blinded assessor); functional score; global improvement scores (self-assessed or by blinded assessor); tenderness; strength; stiffness. **Adverse effects** of treatment. There is an array of validated patient-reported outcome measures specific to assessment of the shoulder; commonly used questionnaires include the Constant–Murley shoulder score, the Oxford Shoulder Score, and the Shoulder Pain and Disability Index. [21] [22] [23] [24] [25] [26] [27] [28] Many of the validated measures include different elements; for example, pain and disability, in an overall score.
METHODS	*Clinical Evidence* search and appraisal August 2009. The following databases were used to identify studies for this systematic review: Medline 1966 to August 2009, Embase 1980 to August 2009, and The Cochrane Database of Systematic Reviews 2009, Issue 3 (1966 to date of issue). An additional search within The Cochrane Library was carried out for the Database of Abstracts of Reviews of Effects (DARE) and Health Technology Assessment (HTA). We also searched for retractions of studies included in the review. Abstracts of the studies retrieved from the initial search were assessed by an information specialist. Selected studies were then sent to the contributor for additional assessment, using pre-determined criteria to identify relevant studies. Study design criteria for inclusion in this review were: published systematic reviews of RCTs and RCTs in any language, at least single blinded, and containing more than 20 individuals of whom more than 80% were followed up. There was no minimum length of follow-up required to include studies. We excluded all studies described as "open", "open label", or not blinded unless blinding was impossible. We included systematic reviews of RCTs and RCTs where harms of an included intervention were studied applying the same study design criteria for inclusion as we did for benefits. In addition, we use a regular surveillance protocol to capture harms alerts from organisations such as the US Food and Drug Administration (FDA) and the UK Medicines and Healthcare products Regulatory Agency (MHRA), which are added to the reviews as required. **General reporting:** At this update of the review, we have revised the previous structure of the reporting of this review to separately present data in people with non-specific shoulder pain, acromioclavicular joint disease, glenohumeral joint disease, and rotator cuff disease. We compared each intervention versus placebo or no treatment and versus any other listed intervention, and reported any studies of sufficient quality that we found. To aid readability of the numerical data in our reviews, we round many percentages to the nearest whole number. Readers should be aware of this when relating percentages to summary statistics such as relative risks (RRs) and odds ratios (ORs). We have performed a GRADE evaluation of the quality of evidence for interventions included in this review (see table, p 34). The categorisation of the quality of the evidence (into high, moderate, low, or very low) reflects the quality of evidence available for our chosen outcomes in our defined populations of interest. These categorisations are not necessarily a reflection of the overall methodological quality of any individual study, because the Clinical Evidence population and outcome of choice may represent only a small subset of the total outcomes reported, and population included, in any individual trial. For further details of how we perform the GRADE evaluation and the scoring system we use, please see our website (www.clinicalevidence.com).

QUESTION	**What are the effects of oral drug treatment in people with shoulder pain?**

OPTION	**CORTICOSTEROIDS (ORAL)**

Symptom improvement

Oral corticosteroids compared with placebo in people with glenohumeral joint disease Oral corticosteroids may be more effective than placebo at reducing pain and disability, and at increasing range of active motion and overall participant-rated improvement at 3 weeks in people with frozen shoulder, but may be no more effective than placebo at 6, 12, and 18 weeks (very low-quality evidence).

Oral corticosteroids plus home exercises compared with home exercises alone in people with glenohumeral joint disease We don't know whether oral corticosteroids plus home exercise are more effective than home exercise alone at improving pain or function (range of abduction, flexion, and external rotation) at 8 months in people with frozen shoulder (low-quality evidence).

Oral corticosteroids plus manipulation under anaesthesia (MUA) plus intra-articular injection (IAI) of corticosteroid compared with placebo plus MUA plus IAI of corticosteroid in people with glenohumeral joint disease We don't know whether oral corticosteroid plus MUA plus IAI of corticosteroid is more effective than placebo plus MUA plus IAI of corticosteroid at increasing the proportion of people with a "dramatic response" to manipulation or at improving shoulder movement in people with frozen shoulder (low-quality evidence).

Oral corticosteroids plus physiotherapy compared with IAI of corticosteroids plus physiotherapy in people with glenohumeral joint disease Oral corticosteroids plus physiotherapy may be less effective than IAI of corticosteroids plus physiotherapy at improving cure (defined as regaining 90% of glenohumeral joint movement) at 1 week in people with frozen shoulder, but we don't know about at 2 and 3 weeks. We don't know whether oral corticosteroids plus physiotherapy is more effective than IAI of corticosteroids plus physiotherapy at improving pain at 1 to 3 weeks (very low-quality evidence).

Note

The adverse effects of corticosteroids are well documented. We found no direct evidence from RCTs about the effects of oral corticosteroids in people with non-specific shoulder pain, acromioclavicular joint disease, or rotator cuff disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits:	**Oral corticosteroids in people with non-specific shoulder pain:** We found no systematic review or RCTs.

Oral corticosteroids in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Oral corticosteroids versus placebo in people with glenohumeral joint disease:
We found one systematic review (search date 2005), which found two small RCTs in people with frozen shoulder. [29] The review did not pool data. The first included RCT (32 people with frozen shoulder) compared oral corticosteroids (cortisone acetate 200 mg/day for the first 3 days, 100 mg up to day 14, then 12.5 mg every 2 days up to 4 weeks) versus placebo. [30] It found no evidence that oral corticosteroids reduced pain more than placebo after 18 weeks, but it did not report between-group comparisons (mean improvement on 4-point rating scale [0 = no pain, 3 = severe pain]: from 1.4 at baseline to 0.5 with oral corticosteroids *v* 1.4 at baseline to 0.6 with placebo; P values not reported). [30] The second included RCT (50 people with frozen shoulder) compared oral prednisolone 30 mg daily versus placebo for 3 weeks. [31] It found that oral prednisolone significantly reduced overall pain at 3 weeks compared with the placebo group (mean change from baseline measure on a scale of 0–10, where 0 = no pain: 4.1 with prednisolone *v* 1.4 with placebo; adjusted difference in means 2.4, 95% CI 1.1 to 3.8). There was also greater improvement in disability, range of active motion, and participant-rated improvement (proportion of participants who reported marked or moderate overall improvement: 22/23 [96%] with prednisolone *v* 11/23 [48%] with placebo; RR 2.0, 95% CI 1.3 to 3.1). At 6 weeks, the analysis favoured the prednisolone group for most outcomes but none of the differences were significant. At 12 weeks, the analysis tended to favour the placebo group although, again, for most outcomes the differences between groups were not significant.

Oral corticosteroids plus home exercise versus home exercise alone in people with glenohumeral joint disease:
We found one systematic review (search date 2005), [29] which found one RCT (40 people with frozen shoulder). [32] People in both groups also took non-salicylate analgesics and diazepam (5 mg) at night as needed. The review found no significant difference between oral corticosteroids (10 mg for 4 weeks and 5 mg for a further 2 weeks) plus advice on home pendular exercises and advice alone for pain or function at 8 months (severe residual pain: RR 0.5, 95% CI 0.05 to 5.08; mild pain on movement: RR 0.5, 95% CI 0.14 to 1.73; range of abduction: mean difference –4.00, 95% CI –14.82 to +6.62, units not specified; range of flexion: mean difference –4.00, 95% CI –15.95 to +7.95, units not specified; range of external rotation: mean difference 0, 95% CI –8.52 to +8.52), units not specified. [29]

Oral corticosteroids plus manipulation under anaesthesia (MUA) plus intra-articular injection (IAI) of corticosteroid versus placebo plus MUA plus IAI of corticosteroid in people with glenohumeral joint disease:
We found one systematic review (search date 2005), [29] which found one small RCT. [33] The RCT (30 people with frozen shoulder) compared oral prednisolone (5 mg 3 times daily for 2 weeks prior to MUA and IAI of corticosteroid and for 2 weeks following, in diminishing doses) versus placebo (identical protocol to first group but with placebo tablets). Two weeks after starting oral therapy, both groups had MUA and IAI of corticosteroid (hydrocortisone acetate 25 mg plus 0.5% bupivacaine 10 mL into the glenoumeral joint) followed by supervised physiotherapy. The review found that oral corticosteroids significantly improved external rotation at 6 weeks compared with placebo (external rotation at least 75% of normal movement in unaffected shoulder: 7/12 [58%] with oral corticosteroids *v* 2/16 [13%] with placebo; RR 4.67, 95% CI 1.17 to 18.58), but found no significant difference in external rotation between groups at 12 or 18 weeks (external rotation at least 75% of normal movement in unaffected shoulder; 12 weeks: 8/12 [67%] with oral corticosteroids *v* 6/16 [38%] with placebo; RR 1.78, 95% CI 0.84 to 3.76; 18 weeks: 7/12 [58%] with oral corticosteroids *v* 7/16 [44%] with placebo; RR 1.33, 95% CI 0.64 to 2.78). [29] The review also found no significant difference between the two groups for all other outcomes (dramatic response to manipulation: 7/12 [58%] with oral corticosteroids *v* 5/16 [31%] with placebo; RR 1.87, 95% CI 0.78 to 4.46; shoulder flexion at least 75% of normal movement in unaffected shoulder at 18 weeks: 11/12 [92%] with oral corticosteroids *v* 12/16 [75%] with placebo; RR 1.22, 95% CI 0.88 to 1.70). [29]

Oral corticosteroids plus physiotherapy versus intra-articular injection (IAI) of corticosteroids plus physiotherapy in people with glenohumeral joint disease:
We found one systematic review (search date 2005), [29] which found one small RCT. [34] The RCT (28 people with frozen shoulder) compared oral corticosteroids (triamcinolone 4 mg 3 times daily for 1 week, then twice daily for 1 week, then once daily for 1 week) versus IAI of corticosteroids (triamcinolone 40 mg to glenohumeral joint). Both groups also received physiotherapy from day 4 and, in addition, could use ice and hot packs, but no other forms of treatment. The review found that oral corticosteroids significantly reduced the proportion of people cured compared with injection at 1 week (cure defined as regaining 90% of glenohumeral joint movement: 2/15 [13%] with oral corticosteroids *v* 8/13 [62%] with injection; RR 0.22, 95% CI 0.06 to 0.84), but found no significant difference between groups at 2 or 3 weeks (2 weeks: RR 0.65, 95% CI 0.42 to 1.01; 3 weeks: RR 0.81, 95% CI 0.61 to 1.07). [29] The review reported that a significant difference in pain was also reported at 1 week, although the original RCT did not specify which group had better values; but there were no differences between groups at 2 or 3 weeks (further details not reported). [29]

Oral corticosteroids in people with rotator cuff disease:
We found no systematic review or RCTs.

Harms:

General harms:
The adverse effects of oral corticosteroids are well documented and include a wide array of problems affecting many body systems. Common or serious adverse effects include: osteoporosis, diabetes, dyspepsia, weight gain, and impaired healing. These effects can be minimised by using the lowest effective dose for the minimum period possible (see *Clinical Evidence* review on asthma).

Oral corticosteroids in people with non-specific shoulder pain:
We found no RCTs.

Oral corticosteroids in people with acromioclavicular joint disease:
We found no RCTs.

Oral corticosteroids versus placebo in people with glenohumeral joint disease:
The review reported that one included RCT (50 people) found no significant difference in adverse effects in the oral corticosteroids group compared with the placebo group, and that one participant in the placebo group developed a stress fracture in the foot (further details not reported). [29] The review reported that the other included RCT (32 people) reported that, in the oral corticosteroid group, one person died from coronary artery disease (this was not attributed to corticosteroid therapy) and one person developed follicular dermatitis during the fourth week of treatment and withdrew from the trial. [29]

Oral corticosteroids plus home exercise versus home exercise alone in people with glenohumeral joint disease:
The RCT identified by the review did not report on adverse effects. [29]

Oral corticosteroids plus manipulation under anaesthesia (MUA) plus intra-articular injection (IAI) of corticosteroid versus placebo plus MUA plus IAI of corticosteroid in people with glenohumeral joint disease:
The RCT identified by the review did not report on adverse effects. [29]

Oral corticosteroids plus physiotherapy versus intra-articular injection (IAI) of corticosteroid plus physiotherapy in people with glenohumeral joint disease:
The review reported that the RCT reported that three people in the oral corticosteroid group had epigastric pain and three people in the IAI group had pain around the site of injection (further details not reported). [29]

Oral corticosteroids in people with rotator cuff disease:
We found no RCTs.

Comment: None.

OPTION	NSAIDS (ORAL)

Symptom improvement
Oral NSAIDs compared with placebo in people with rotator cuff disease Oral NSAIDs may be more effective than placebo at reducing pain at 7 to 14 days in people with acute-onset shoulder tendonitis, subacromial bursitis, or both, and at reducing pain at 14 days in people with acute shoulder pain of less than 96 hours' duration. We don't know whether oral NSAIDs are more effective than placebo at improving pain or abduction at 4 weeks in people with rotator cuff tendonitis of more than 72 hours' duration (very low-quality evidence).

Note
NSAIDs are associated with well-documented adverse effects such as gastrointestinal symptoms, skin rash, headache, and dizziness. We found no direct evidence from RCTs on the effects of oral NSAIDs in people with non-specific shoulder pain, acromioclavicular joint disease, or glenohumeral joint disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Oral NSAIDS in people with non-specific shoulder pain:**
We found no systematic review or RCTs.

Oral NSAIDS in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Oral NSAIDS in people with glenohumeral disease:
We found no systematic review or RCTs.

Oral NSAIDs versus placebo in people with rotator cuff disease:
We found one systematic review (search date 1998, 4 small RCTs, 151 people with shoulder pain for more than 72 hours; see comment below), [35] one additional, [36] and one subsequent RCT. [37] The review pooled results from RCTs that reported sufficient data (2 RCTs, [38] [39] 90 people with rotator cuff tendonitis) and found no significant reduction in pain and no significant improvement in abduction between the oral NSAIDs diclofenac or naproxen and placebo after 4 weeks (pain: visual analogue scale [VAS], WMD +3 cm, 95% CI −19 cm to +25 cm, where positive values represent deterioration; abduction: WMD +26°, 95% CI −9° to +61°, where positive values represent improvement). [35]

The additional RCT (69 people with acute shoulder pain of less than 96 hours' duration) found that oral flurbiprofen 300 mg daily significantly improved pain relief, as judged by the investigator, compared with placebo at 14 days (global assessment by investigator: 30/35 [86%] improved with NSAID *v* 19/32 [59%] with placebo; ARR 26%, 95% CI 5% to 46%; NNT 4, 95% CI 3 to 20). [36]

The subsequent RCT (306 people with acute-onset shoulder tendonitis, subacromial bursitis, or both) compared three interventions: celecoxib (initial dose 400 mg plus 200 mg 8 hours later, followed by 200 mg twice daily), naproxen (500 mg twice daily), or placebo (twice daily) for 14 days. [37] A total of 254 people completed the trial; results were analysed by intention to treat. The RCT found that celecoxib significantly reduced pain at 7 and 14 days compared with placebo (mean reduction from baseline in Maximum Pain Intensity at Rest measured on a VAS, where 0 mm = no pain and 100 mm = worst pain; at 7 days: −27.7 mm with celecoxib *v* −18.4 mm with placebo; P less than 0.05; at 14 days: −35.0 mm with celecoxib *v* −25.0 mm with placebo; P less than 0.05). It also found that naproxen significantly reduced pain at 7 days compared with placebo (mean reduction from baseline in Maximum Pain Intensity at Rest measured on the same VAS: −26.4 mm with naproxen *v* −18.4 mm with placebo; P less than 0.05), but found no significant difference in

pain at 14 days (reported as not significant; absolute results not reported). Secondary measures of efficacy, such as Physician's Global Assessment of Shoulder Tendonitis and/or Bursitis, also found that celecoxib and naproxen were significantly better than placebo.

Harms: NSAIDs are associated with adverse effects such as gastrointestinal symptoms, skin rash, headache, and dizziness, and there have been various alerts surrounding their use (see NSAIDs review).

Oral NSAIDs in people with non-specific shoulder pain:
We found no RCTs.

Oral NSAIDs in people with acromiocalvicular joint disease:
We found no RCTs.

Oral NSAIDs in people with glenohumeral joint disease:
We found no RCTs.

Oral NSAIDs versus placebo in people with rotator cuff disease:
The review found insufficient evidence from one RCT to assess the adverse effects of oral NSAIDs compared with placebo. [35] It found no evidence that the incidence or nature of adverse effects varied among NSAIDs (naproxen, diclofenac, flurbiprofen, indometacin, etodolac, ibuprofen, fentiazac, phenylbutazone, piroxicam). Adverse effects were mostly gastrointestinal symptoms, skin rash, headache, or dizziness. The additional RCT found that 8/35 (23%) people taking flurbiprofen had adverse effects compared with 3/34 (9%) taking placebo; almost all adverse effects were gastrointestinal symptoms; the RCT did not assess the significance of the difference between groups. [36] The subsequent RCT found that 37% of people taking celecoxib, 36% taking naproxen, and 30% taking placebo had adverse effects, primarily headache, dyspepsia, and nausea; the RCT did not assess the significance of the difference between groups. [37] We found no systematic review of the adverse effects of cyclo-oxygenase type 2 selective agents in people with shoulder pain (see differences between NSAIDs in the NSAIDs review). Withdrawal due to adverse effects occurred in less than 10% of people in non-randomised comparative studies, but in up to 20% of people in RCTs.

Comment: The Cochrane review has been withdrawn, however, we have reported it as we found no subsequent reviews that have pooled data. [35] The Cochrane review of interventions in shoulder pain will be superseded by more specific reviews, including a review on the effects on NSAIDs in shoulder pain, which will be reported in this review when published.

Clinical guide:
Evidence about the effects of NSAIDs in shoulder disorders is limited by the lack of standardised approaches: diverse disorders have been considered together, different types of NSAIDs were used, and outcome measures and follow-up periods vary among RCTs. In addition, pain is a symptom, and so relying on investigator-rated pain may not be valid.

OPTION   OPIOID ANALGESICS

We found no direct information from RCTs about the effects of opioid analgesics in people with shoulder pain.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: We found no systematic review or RCTs evaluating opioid analgesics in people with shoulder pain.

Harms: We found no RCTs.

Comment: None.

OPTION   PARACETAMOL

We found no direct information from RCTs about the effects of paracetamol in people with shoulder pain.

Note
The FDA issued a drug safety alert on the risk of rare but serious skin reactions with paracetamol (acetaminophen) (August 2013).

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: We found no systematic review or RCTs evaluating paracetamol in people with shoulder pain.

Harms: We found no RCTs.
Drug safety alert:
August 2013, paracetamol (acetaminophen) The Food and Drug Administration (FDA) has issued a drug safety alert on the risk of rare but serious skin reactions with paracetamol (acetaminophen). These skin reactions, known as Stevens–Johnson Syndrome (SJS), toxic epidermal necrolysis (TEN), and acute generalised exanthematous pustulosis (AGEP), can be fatal.(www.fda.gov/)

Comment: None.

QUESTION What are the effects of topical drug treatment in people with shoulder pain?

OPTION NSAIDS (TOPICAL)

We found no direct information from RCTs about the effects of topical NSAIDs in people with shoulder pain.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: We found no systematic review or RCTs of topical NSAIDs in people with shoulder pain.

Harms: We found no RCTs.

Comment: See topical NSAIDs in review on NSAIDs.

QUESTION What are the effects of local injections in people with shoulder pain?

OPTION SUPRASCAPULAR NERVE BLOCK

Symptom improvement
Suprascapular nerve block compared with placebo in people with glenohumeral joint disease Suprascapular nerve block may be more effective than placebo at reducing pain at 4 weeks in people with frozen shoulder, but not in improving shoulder function (measured by Simple Shoulder Test) or range of movement. Suprascapular nerve block may be more effective than placebo at improving pain, disability, and range of movement scores (measured by Shoulder Pain and Disability Index, and active abduction) at 1, 4, and 12 weeks in people with rheumatoid arthritis, degenerative disease, or both. We don't know whether adding suprascapular nerve block is more effective than adding placebo at improving pain at 24 hours, patient satisfaction, or sleep quality, in people having ambulatory non-arthroscopic shoulder surgery, all of whom had interscalene brachial plexus block (very low-quality evidence).

Note
We found no direct information from RCTs about the effects of suprascapular nerve block in people with non-specific shoulder pain, acromioclavicular joint disease, or rotator cuff disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Suprascapular nerve block in people with non-specific shoulder pain:**
We found no systematic review or RCTs.

Suprascapular nerve block in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Suprascapular nerve block versus placebo in people with glenohumeral joint disease:
We found no systematic review, but found three RCTs in people with frozen shoulder, degenerative shoulder disease, or having shoulder surgery. [40] [41] [42] The first RCT (34 people with frozen shoulder) compared indirect suprascapular nerve block with bupivacaine 0.5% 10 mL versus nerve block with physiological saline 10 mL (placebo) given three times at 7-day intervals. [42] The RCT did not perform an analysis by intention to treat; 11% of people receiving bupivacaine and 30% receiving placebo withdrew from the trial. The RCT found that bupivacaine nerve block significantly reduced pain at 1 month compared with placebo (% reduction in pain as measured by the McGill Pain Questionnaire multidimensional pain descriptors score: 64% with bupivacaine *v* 13% with placebo; P = 0.03). It found no significant difference in shoulder function (% improvement in function measured by the 12-point Simple Shoulder test: 16% with bupivacaine *v* 4% with placebo; P = 0.24). It found no significant difference in shoulder range of movement (ROM) between groups (% improvement as measured by composite score for shoulder motion: 30% with bupivacaine *v* 43% with placebo; P = 0.67). [42]

The second RCT (108 shoulders, 83 people with rheumatoid arthritis, degenerative disease, or both of the shoulder) compared nerve block versus subcutaneous saline. [40] The RCT randomised

shoulders rather than people. It found that shoulders receiving suprascapular nerve block had significant and clinically important improvements in all pain scores, all disability scores, and some ROM scores at 1, 4, and 12 weeks compared with shoulders receiving placebo (proportion of shoulders that had improved by at least 10 points on the Shoulder Pain and Disability Index [maximum score 100] at 12 weeks: 55% with nerve block v 18% with placebo; P less than 0.01; absolute numbers not reported; mean change in active abduction at 12 weeks: mean 14.7° with nerve block v 5.1° with placebo; mean difference 9.6°, 95% CI 0.9° to 18.2°). [40] It is unclear whether the results of this trial can be generalised to people with non-arthritic shoulder pain.

The third RCT (50 people having ambulatory non-arthroscopic shoulder surgery, all of whom receiving interscalene brachial plexus block) compared adding suprascapular nerve block versus adding placebo. [41] The RCT found that nerve block significantly delayed the time to "first significant pain" compared with placebo (594 minutes with nerve block v 375 minutes with placebo; P = 0.02). The RCT did not define "first significant pain". The RCT found no significant difference between groups in pain at 24 hours, use of supplemental analgesia, or quality of life outcomes such as patient satisfaction or sleep quality (reported as not significant; P values not reported; absolute results tabulated). [41]

Suprascapular nerve block in people with rotator cuff disease:
We found no systematic review or RCTs.

Harms: **Suprascapular nerve block in people with non-specific shoulder pain:**
We found no RCTs.

Suprascapular nerve block in people with acromioclavicular joint disease:
We found no RCTs.

Suprascapular nerve block versus placebo in people with glenohumeral joint disease:
The first RCT found that some people had transient dizziness and local tenderness at the injection site (no further data reported). [42] In the second RCT, one person receiving nerve block had chest pain and one receiving placebo had bruising. [40] The third RCT gave no information on adverse effects. [41]

Suprascapular nerve block in people with rotator cuff disease:
We found no RCTs.

Comment: None.

OPTION	INTRA-ARTICULAR CORTICOSTEROID INJECTIONS

Symptom improvement

Intra-articular corticosteroid injections compared with placebo in people with glenohumeral joint disease Intra-articular corticosteroid injections may be more effective than placebo at improving pain and disability (measured by Shoulder Pain and Disability Index, Shoulder Disability Questionnaire, global disability [measured by visual analogue scale]) at 6 weeks in people with frozen shoulder, but not at improving range of passive external rotation at 6 weeks, or pain and disability outcomes at 16 and 52 weeks (very low-quality evidence).

Intra-articular corticosteroid injection plus lidocaine compared with lidocaine alone in people with glenohumeral joint disease We don't know whether intra-articular corticosteroid injection plus lidocaine is more effective than lidocaine alone at improving pain or range of shoulder movement at 24 weeks in people with frozen shoulder (low-quality evidence).

Intra-articular corticosteroid injections compared with physiotherapy in people with glenohumeral joint disease Intra-articular corticosteroid injections may be more effective than physiotherapy at improving pain and disability (measured by Shoulder Pain and Disability Index) at 6 weeks, and treatment success (defined as recovered or much improved) at 7 and 52 weeks in people with frozen shoulder, but not at improving pain and disability at 52 weeks (very low-quality evidence).

Intra-articular corticosteroid injection plus physiotherapy compared with oral corticosteroids plus physiotherapy in people with glenohumeral joint disease Intra-articular injection of corticosteroids plus physiotherapy may be more effective than oral corticosteroids plus physiotherapy at improving cure (defined as regaining 90% of glenohumeral joint movement) at 1 week in people with frozen shoulder, but we don't know whether it is more effective at 2 and 3 weeks. We don't know whether intra-articular injection of corticosteroids plus physiotherapy is more effective than oral corticosteroids plus physiotherapy at improving pain at 1 to 3 weeks (very low-quality evidence).

Intra-articular corticosteroid injection plus physiotherapy compared with manipulation under anaesthesia plus physiotherapy in people with glenohumeral joint disease We don't know whether intra-articular corticosteroid injection

plus physiotherapy is more effective than manipulation under anaesthesia plus physiotherapy at reducing pain (measured by visual analogue scale) or at improving overall shoulder scores (measured by Constant–Murley shoulder score) at 16 weeks, or at improving overall health scores (measured by SF-36) at 2 years in people with frozen shoulder (very low-quality evidence).

Intra-articular corticosteroid injections plus lidocaine versus placebo in people with rotator cuff disease Intra-articular corticosteroid injections plus lidocaine may be no more effective than placebo at improving pain or treatment success (not further defined) at 4 weeks in people with rotator cuff lesions (very low-quality evidence).

Note
We found no direct evidence from RCTs on the effects on intra-articular corticosteroid injections in people with non-specific shoulder pain or with acromioclacicular joint disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Intra-articular corticosteroid injections in people with non-specific shoulder pain:**
We found no systematic review or RCTs.

Intra-articular corticosteroid injections in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Intra-articular corticosteroid injections versus placebo in people with glenohumeral joint disease:
We found no systematic review, but found two RCTs. [43] [44] The first RCT (93 people with frozen shoulder) compared four treatments: intra-articular corticosteroid injection (triamcinolone hexacetonide 40 mg under fluoroscopic control) plus physiotherapy, corticosteroid injection alone, saline injection plus physiotherapy, and saline injection alone. [43] It found that intra-articular corticosteroids (with or without physiotherapy) significantly improved pain and disability at 6 weeks compared with placebo, but found no significant difference at 12 months (improvement in shoulder pain and disability index score at 6 weeks: 46.5 with corticosteroid plus physiotherapy *v* 36.7 with corticosteroid alone *v* 18.9 with placebo; P = 0.0004 for both corticosteroid treatments *v* placebo; at 12 months: 48.3 with corticosteroid plus physiotherapy *v* 50.1 with corticosteroid alone *v* 47.2 with placebo; P value not reported).

The second RCT (80 people with frozen shoulder of less than 6 months' duration) compared four interventions: injection of triamcinolone 20 mg versus placebo with or without physiotherapy. [44] All participants were given an identical home-exercise programme. Outcome measures were assessed at 6 and 16 weeks. The primary outcome measure was the Shoulder Disability Questionnaire score. Secondary outcomes were measurement of pain using a visual analogue scale (VAS), global disability using the VAS, and range of passive external rotation. The RCT did not directly compare corticosteroid injection versus physiotherapy; instead, it performed a two-way analysis of variance to assess the effects of each intervention separately. It found that corticosteroids significantly improved disability and self-assessment of global disability at 6 weeks compared with no corticosteroids (mean change from baseline in Shoulder Disability Questionnaire: –6.9 with triamcinolone *v* –3.3 with no triamcinolone; global VAS: –33.4 with triamcinolone *v* –21.8 with no triamcinolone; P = 0.004 for both outcomes). There was no significant difference in the other measured outcomes (P greater than 0.05). At 16 weeks, all groups had improved to a similar degree with respect to all outcome measures.

Intra-articular corticosteroid injections plus lidocaine versus lidocaine alone in people with glenohumeral joint disease:
We found one systematic review (search date 2002, 1 RCT). [45] The RCT identified by the review (48 people with frozen shoulder) compared four treatments: intra-articular methylprednisolone plus lidocaine; intra-articular lidocaine; intrabursal methylprednisolone plus lidocaine; and intrabursal lidocaine. [46] It found no significant difference between intra-articular methylprednisolone plus lidocaine and lidocaine alone in pain score or shoulder motion at 24 weeks (pain on 6-point pain scale [0 = no pain; 5 = most severe]: improvement of about 1 point in both groups [absolute score about 3 in both groups]; P greater than 0.05; shoulder motion: improvement of about 50° in both groups [absolute range of movement about 350° in both groups]; P greater than 0.05). [46] The RCT may have been too small to detect a clinically important difference between groups.

Intra-articular corticosteroid injections versus physiotherapy in people with glenohumeral joint disease:
We found one systematic review (search date 2002, [45] 1 RCT [47]) and one subsequent RCT. [43] The RCT identified by the review (109 people with frozen shoulder) compared up to three injections of intra-articular triamcinolone acetonide 40 mg versus 12 physiotherapy sessions over 6 weeks. [47] It found that corticosteroid injection significantly increased success rates at 7 weeks compared

with physiotherapy, but the difference in severity score was less significant at 52 weeks (success, defined as complete recovery or much improved at 7 weeks: 40/52 [77%] with corticosteroids *v* 26/56 [46%] with physiotherapy; RR 1.66, 95% CI 1.21 to 2.28; mean improvement in severity score at 52 weeks: 70 with corticosteroids *v* 59 with physiotherapy; difference 11, 95% CI 1 to 23). The first subsequent RCT (93 people with frozen shoulder) compared four treatments: intra-articular triamcinolone hexacetonide 40 mg under fluoroscopic control plus physiotherapy, corticosteroid injection alone, saline injection plus physiotherapy, and saline injection alone. [43] It found that corticosteroid alone significantly improved pain and disability at 6 weeks compared with physiotherapy alone, but found no significant difference at 12 months (improvement in shoulder pain and disability index score at 6 weeks: 36.7 with corticosteroid alone *v* 22.2 with physiotherapy alone; P less than 0.05; at 12 months: 50.1 with corticosteroid alone *v* 45.5 with physiotherapy alone; P value not reported).

Intra-articular corticosteroid injections plus physiotherapy versus oral corticosteroids plus physiotherapy in people with glenohumeral joint disease:
See benefits of oral corticosteroids, p 3 .

Intra-articular corticosteroid injections plus physiotherapy versus manipulation under anaesthesia plus physiotherapy in people with glenohumeral joint disease:
We found no systematic review, but found one RCT. [48] The RCT (53 people with frozen shoulder) compared manipulation of the glenohumeral joint under anaesthesia followed by exercises provided by a physiotherapist versus three intra-articular injections of corticosteroid (40 mg triamcinolone in 1 mL, 5 mL of 2% lidocaine, 10 mL of 0.25% bupivacaine, and 5 mL of air given via posterior route) to the affected glenohumeral joint 6 weeks apart followed by the same physiotherapy exercises as the manipulation group. The RCT found no significant difference between groups in pain (measured by VAS [score 1–100]) or shoulder score (Constant–Murley shoulder score) at 16 weeks or in changes of SF-36 health questionnaire at 2 years (results presented graphically; absolute numbers and P values not reported; reported as no significant difference between groups). [48]

Intra-articular corticosteroid injections plus lidocaine versus placebo in people with rotator cuff disease:
We found one systematic review (search date 2002, 1 RCT). [45] The RCT (60 people with rotator cuff lesions, 12 in each treatment group) compared five treatments: tolmetin plus methyl prednisolone plus lidocaine, methylprednisolone plus lidocaine, acupuncture, ultrasound, and placebo. It found no significant difference between intra-articular injection and placebo in pain or treatment success at 4 weeks (pain on a 100-mm VAS: 29.2 mm with intra-articular injection *v* 22.0 mm with placebo; P value not reported). The RCT may have been too small to detect a clinically important difference between groups.

Harms: **General harms:**
Intra-articular injections are rarely associated with infection (estimated at 1/14,000 to 1/50,000 injections). [49] [50] Acute self-limited synovitis was reported in up to 2% of people. Prevalence of tendon rupture, including rupture of the bicipital tendon and rotator cuff, was reported in less than 1% of people after local injection of corticosteroids. [49] Subcutaneous fat necrosis or skin atrophy was found in less than 1%. Corticosteroid arthropathy and osteonecrosis were rare (less than 0.8%) and seemed to affect mostly weight-bearing joints. [38]

Intra-articular corticosteroid injections in people with non-specific shoulder pain:
We found no RCTs.

Intra-articular corticosteroid injections in people with acromioclavicular joint disease:
We found no RCTs.

Intra-articular corticosteroid injections versus physiotherapy in people with glenohumeral joint disease:
The RCT identified by the systematic review [45] compared corticosteroid injection versus physiotherapy in painful stiff shoulders, and reported that corticosteroids were associated with more facial flushing (9/52 [17%] people treated with corticosteroid injections *v* 1/56 [2%] treated with physiotherapy) and more new menstrual irregularities (6/52 [12%] people with local corticosteroid injections *v* 0/56 [0%] people with physiotherapy). [47] Both treatments were associated with fever during treatment (7% of people with corticosteroid injection *v* 2% with physiotherapy) and local skin irritation (2% with corticosteroid injection *v* 3.5% with physiotherapy). People having physiotherapy had tingling, radiation of pain down the arm, or slight swelling after treatment (7%) whereas people having corticosteroid injections had sweating, fatigue, dry mouth, dizziness, or headache (11%). The subsequent RCT comparing corticosteroid with and without physiotherapy versus placebo gave no information on adverse effects. [43]

Intra-articular corticosteroid injections plus physiotherapy versus oral corticosteroids plus physiotherapy in people with glenohumeral joint disease:
See harms of oral corticosteroids, p 3 .

Intra-articular corticosteroid injections plus physiotherapy versus manipulation under anaesthesia plus physiotherapy in people with glenohumeral joint disease:
The RCT reported that no local or systemic complications were noted in either treatment group. [48]

Comment: Few RCTs of interventions in shoulder pain used high-quality methods. One case control study found that clinical outcome correlated with accuracy of injection. [51]   Another case control study found that only 10% of intra-articular injections were placed correctly, even by experienced operators. [52]   Confirmation of injection accuracy can be obtained with fluoroscopy or ultrasound although the efficacy of accurate (intra-articular) versus inaccurate (extra-articular or remote) injections of corticosteroids is unconfirmed.

Different doses:
We found one RCT (57 people with frozen shoulder). [53]   It found that higher-dose (40 mg) compared with lower-dose (10 mg) triamcinolone injection significantly reduced pain after 6 weeks (change on 100-mm visual analogue scale: 31 mm with low dose *v* 49 mm with high dose; CI not reported; P less than 0.01), movement restriction, and self-rated functional impairment (change on 4-point ordinal scale: 0.7 with low dose *v* 1.3 with high dose; CI not reported; P = 0.03), but did not significantly improve sleep disturbance. The RCT found no significant difference in any outcome after 6 months.

OPTION   INTRA-ARTICULAR NSAID INJECTIONS

We found no direct information from RCTs about the effects of intra-articular NSAID injections in people with shoulder pain.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: We found no systematic review or RCTs evaluating intra-articular injection of NSAIDs.

Harms: We found no RCTs.

Comment: None.

OPTION   SUBACROMIAL CORTICOSTEROID INJECTIONS

Symptom improvement
Subacromial corticosteroid injection plus lidocaine compared with physiotherapy in people with non-specific shoulder pain Subacromial corticosteroid injection plus lidocaine may be less effective than physiotherapy at reducing the proportion of people with the composite outcome of needing a repeat consultation or further intervention in people with new episodes of unilateral shoulder pain, but may be no less effective in reducing disability or increasing successful outcome at 6 months (low-quality evidence).

Subacromial corticosteroid injections plus lidocaine compared with lidocaine alone in people with rotator cuff disease We don't know whether subacromial corticosteroid injection plus lidocaine is more effective than lidocaine alone at improving pain or function in people with rotator cuff tendonitis, partial tear, or subacromial impingement (very low-quality evidence).

Subacromial corticosteroid injections plus bupivacaine compared with bupivacaine alone in people with rotator cuff disease We don't know whether subacromial corticosteroid injections plus bupivacaine are more effective than bupivacaine alone at improving pain or active shoulder abduction at 3, 6, or 12 weeks in people with post-traumatic impingement of the shoulder (low-quality evidence).

Note
We found no direct information from RCTs about the effects of subacromial corticosteroid injections in people with acromioclavicular joint disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Subacromial corticosteroid injections versus placebo in people with non-specific shoulder pain:**
We found one systematic review (search date 2002), which identified no RCTs. [45]

Subacromial corticosteroid injections plus lidocaine versus physiotherapy in people with non-specific shoulder pain:
We found one systematic review (search date 2006, 1 RCT). [54] The RCT included 207 people attending their physician with a new episode of unilateral shoulder pain. [55] It found no significant difference between subacromial methylprednisolone plus lidocaine and physiotherapy (8 sessions over 6 weeks) in disability or successful outcome at 6 months (disability, measured on the validated shoulder disability questionnaire from 0 [no disability] to 23 [severe disability]: mean difference +1.4, 95% CI –0.2 to +3.0; successful outcome, defined as 50% drop in disability score from baseline: 53% with injection v 60% with physiotherapy; difference +7%, 95% CI –6.8% to +20.4%). It found that corticosteroid injection significantly increased the combined outcome of need for repeat consultation or other intervention for shoulder pain compared with physiotherapy (57% with injection v 40% with physiotherapy; difference 17%, 95% CI 4% to 31%). [55]

Subacromial corticosteroid injections in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Subacromial corticosteroid injections in people with glenohumeral joint disease:
We found no systematic review or RCTs.

Subacromial corticosteroid injections plus lidocaine versus lidocaine alone in people with rotator cuff disease:
We found one systematic review (search date 2002, [45] 4 RCTs [38] [56] [57] [58]) and one subsequent RCT. [59] The first RCT identified by the review (60 people with rotator cuff tendonitis) compared three treatments: subacromial triamcinolone plus lidocaine (1 mL of 80 mg/mL triamcinolone plus 2 mL of 0.5% lidocaine), subacromial lidocaine (3 mL of 0.5%), and oral diclofenac plus subacromial lidocaine (diclofenac 50 mg 3 times daily plus 3 mL of 0.5% lidocaine). [38] It found that subacromial triamcinolone plus lidocaine significantly increased clinical response rates at 4 weeks compared with lidocaine alone, but it found no significant difference in pain (clinical response, defined as improvement in a combination of overall pain severity score, range of active abduction, and limitation of function: 70% with triamcinolone plus lidocaine v 0% with lidocaine alone; P less than 0.001; reduction in pain: WMD +7 cm, 95% CI –33 cm to + 47 cm).

The second RCT identified by the review (57 people with rotator cuff tendonitis) found no significant difference between subacromial methylprednisolone (40 mg) plus lidocaine (1 mL of 1%) and lidocaine alone for pain or remission rate at 12 weeks (pain using visual analogue scale [VAS] 0–30: median pain improvement: 8 points with active treatment v 8 points with placebo; P value not reported; remission, defined as score of 0 on pain, active abduction, flexion, and external rotation: 32% in remission with corticosteroids v 26% in remission with placebo; P value not reported). [56]

The third RCT identified by the review (published in abstract form only; 52 people with rotator cuff tendonitis or partial tear, of whom results for 41 people reported) found no significant difference between lidocaine (4 mL of 2%) plus betamethasone (1 mL of 6 mg/mL) and lidocaine (5 mL of 2%) alone for clinical response at 6 months (response rate, measured by American Shoulder and Elbow Surgeons criteria: P = 0.77; no further data reported). [57]

The fourth RCT identified by the review (40 people with subacromial impingement who received physiotherapy) found that triamcinolone acetonide (2 mL of 40 mg/mL) plus lidocaine (4 mL of 1%) significantly reduced pain compared with lidocaine alone (6 mL of 1%), but found no significant difference in activities of daily living after a mean follow-up of about 30 weeks (moderate or severe pain: 3/19 [16%] with corticosteroid plus lidocaine v 15/21 [71%] with lidocaine alone; P value not reported). Loss to follow-up was not clear, and it was not clear whether analysis was by intention to treat. The timing of follow-up ranged from 12 to 55 weeks. [58]

The subsequent RCT (56 people with subacromial impingement) found no significant difference between subacromial injection of methylprednisolone (80 mg in 2 mL) plus lidocaine (1 mL of 1%) and injection of lidocaine alone (3 mL of 1%) for range of motion (ROM) at 3 months or Shoulder Disability Questionnaire [SPQ] score (Spanish version) at any time point up to 3 months following the injection (ROM: adduction, abduction, flexion, extension, internal rotation, external rotation; P greater than 0.05 for all analysis; SPQ assessment at 15 days, 30 days, then monthly: results presented graphically; absolute numbers and P values not reported; reported as no significant difference). [59] The RCT reported that the groups receiving injections of lidocaine alone had a significantly better improvement in pain compared with those receiving corticosteroid plus lidocaine at all time points up to 3 months (assessment at 15 days, 30 days, then monthly: results presented graphically; absolute numbers not reported; P less than 0.001 at all time points). [59]

Subacromial corticosteroid injections plus bupivacaine versus bupivacaine alone in people with rotator cuff disease:
We found one RCT (98 people with persistent, post-traumatic impingement of the shoulder) comparing subacromial methylprednisolone (40 mg) plus bupivacaine (2 mL of 0.5%) versus bupivacaine alone. [60] It found no significant difference in pain scores at 3, 6, or 12 weeks (pain measured on a 10-cm VAS at 12 weeks: 1.38 cm in both groups; P = 0.99). It also found no significant difference in active shoulder abduction at 3, 6, or 12 weeks (mean active abduction at 12 weeks: 168.9° with corticosteroid plus bupivacaine *v* 170.3° with bupivacaine alone; P = 0.8).

Harms: **Subacromial corticosteroid injections versus placebo in people with non-specific shoulder pain:**
We found no RCTs.

Subacromial corticosteroid injections in people with acromioclavicular joint disease:
We found no RCTs.

Subacromial corticosteroid injections in people with glenohumeral joint disease:
We found no RCTs.

Subacromial corticosteroid injections plus lidocaine versus lidocaine alone in people with rotator cuff disease:
The first RCT identified by the review (50 people with rotator cuff tendonitis) found no adverse effects with subacromial corticosteroid plus lidocaine compared with lidocaine alone, apart from mild discomfort. [45] The subsequent RCT reported that one person had severe pain at the injection site in the corticosteroid-injection group, which settled within 2 hours after administration of analgesic. [59]

Comment: ROM is not a satisfactory surrogate measure of function. We found no evidence on the accuracy of placement of subacromial injections, although a double-blind RCT (106 people with rotator cuff disease) published in 2009 found no important differences in short-term outcomes between local ultrasound-guided corticosteroid injection and systemic corticosteroid injection in rotator cuff disease. [61]

OPTION	AUTOLOGOUS WHOLE BLOOD INJECTIONS	New

We found no direct information from RCTs about the effects of autologous whole blood injections in people with shoulder pain.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: We found no systematic review or RCTs evaluating autologous whole blood injection for shoulder pain.

Harms: We found no RCTs.

Comment: Although not currently in routine clinical practice, there is growing orthopaedic interest in the use of autologous bioactive agents such as whole blood, platelet-rich plasma, and stem cells, as either a definitive or adjunctive therapy in stimulating tendon healing and recovery from tendonopathy.

OPTION	PLATELET-RICH PLASMA INJECTIONS	New

Symptom improvement
Open subacromial decompression plus platelet-rich plasma injection compared with open subacromial decompression without platelet-rich plasma injection in people with rotator cuff disease Open subacromial decompression plus platelet-rich plasma injection may be more effective than open subacromial decompression alone at reducing pain and analgesic use and at improving function (measured by Shoulder Index Score, range of motion, cross body adduction) between 1 to 12 weeks in people with rotator cuff impingement, but we don't know if it is more effective at reducing participant-reported shoulder instability (low-quality evidence).

Note
We found no direct evidence from RCTs on the effects of platelet-rich plasma injections in people with non-specific shoulder pain, acromioclavicular joint disease, and glenohumeral joint disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Platelet-rich plasma injections in people with non-specific shoulder pain:**
We found no systematic review or RCTs.

Platelet-rich plasma injections in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Platelet-rich plasma injections in people with glenohumeral joint disease:
We found no systematic review or RCTs.

Open subacromial decompression plus platelet-rich plasma injection versus open subacromial decompression without platelet-rich plasma injection in people with rotator cuff disease:
We found no systematic review, but found one RCT. [62] The RCT (40 people with rotator cuff impingement) measured pain (by 10-point visual analogue scale [VAS] and by analgesic use), Shoulder Index Score (calculated from pain VAS assessment and 10 activities of daily living [ADL] measured on a 4-point scale), range of motion (ROM; forward flexion, external rotation, and external rotation with arm abducted at 90°), cross body adduction, and participant-reported shoulder instability (measured by direct questioning and VAS score). The RCT found that, compared with open subacromial decompression alone, platelet-rich plasma injection plus open subacromial decompression significantly improved Shoulder Index Score and pain (measured by VAS) at 1, 2, 4, and 6 weeks (results presented graphically; P less than 0.001 for all analyses), range of motion at 2, 4, 6, and 12 weeks (results presented graphically; P less than 0.001 at 2, 4, and 6 weeks; P less than 0.05 at 12 weeks), cross body adduction at 6 and 12 weeks (results presented graphically; P less than 0.001), and use of pain medication at 2 weeks (P less than 0.001). The RCT found no significant difference between groups for shoulder instability at any time point (P = 0.13). [62]

Harms: **Platelet-rich plasma injections in people with non-specific shoulder pain:**
We found no RCTs.

Platelet-rich plasma injections in people with acromioclavicular joint disease:
We found no RCTs.

Platelet-rich plasma injections in people with glenohumeral joint disease:
We found no RCTs:

Open subacromial decompression plus platelet-rich plasma injection versus open subacromial decompression without platelet-rich plasma injection in people with rotator cuff disease:
The RCT did not report on adverse effects. [62]

Comment: The evidence includes only a single, relatively small RCT evaluating the use of platelet-rich plasma injections for the treatment of rotator cuff disease. Further research is required in order to further support or refute the efficacy of this treatment. An increasing number of clinical trials are underway and in development looking at the array of applications that may exist for novel autologous bioactive therapies including platelet-rich plasma. See comment on autologous whole blood injections, p 14 .

QUESTION   What are the effects of non-drug treatment in people with shoulder pain?

OPTION   **EXTRACORPOREAL SHOCK WAVE THERAPY**

Symptom improvement
Extracorporeal shock wave therapy (ESWT) compared with placebo in people with rotator cuff disease (calcific tendonitis) ESWT may be more effective than control at improving pain, calcification, and function scores (measured by Constant–Murley score) in people with calcific tendonitis (very low-quality evidence).

ESWT compared with sham treatment in people with rotator cuff disease (non-calcific rotator cuff tendonopathy) We don't know whether ESWT is more effective than sham treatment at improving pain or function (measured by visual analogue scale, Shoulder Pain and Disability Index) at 3 to 6 months in people with chronic non-calcifying rotator cuff tendonitis or supraspinatous tendonosis (very low-quality evidence).

Note
ESWT can be painful during treatment. We found no direct evidence from RCTs on the effects of ESWT in people with non-specific shoulder pain, acromioclavicular joint disease, or glenohumeral joint disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Extracorporeal shock wave therapy (ESWT) in people with non-specific shoulder pain:**
We found no systematic review or RCTs.

ESWT in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

ESWT in people with glenohumeral joint disease:
We found no systematic review or RCTs evaluating treatment with ESWT for people with glenohumeral joint disease.

ESWT versus placebo in people with rotator cuff disease:
We found no systematic review, but found six RCTs, four in people with calcific tendonitis [63] [64] [65] [66] and two in people with non-calcific rotator cuff tendonopathy. [67] [68]

Calcific tendonitis:
The first RCT (115 people with calcific tendonitis) compared three different ESWT regimens (low-energy treatment in a single session *v* a single high-energy session *v* 2 high-energy sessions 1 week apart) versus no treatment. [63] The results of this trial should be interpreted with caution because of the high withdrawal rate and lack of an intention-to-treat analysis. It found that high-energy treatment significantly increased subjective improvement of pain compared with low-energy treatment or placebo at 3 months (81 people analysed; AR for improvement: 14/20 [70%] with 2 high-energy sessions *v* 12/20 [60%] with 1 high-energy session *v* 6/21 [29%] with low-energy treatment *v* 0/20 [0%] with placebo; NNT 2, 95% CI 1 to 21 for high-energy treatment compared with placebo with single session treatment and NNT 2, 95% CI 1 to14 with 2-session treatment). It also found that high-energy treatment significantly improved a combined measure of pain and function in activities of daily living compared with placebo (the Constant–Murley score difference; P less than 0.0001). [63]

The second RCT (144 people with calcific tendonitis) compared three interventions: high-energy ESWT, low-energy ESWT, and sham ESWT. [64] People having high- and low-energy ESWT received the same cumulative-energy dose. Treatment was given in two treatment sessions, approximately 2 weeks apart, followed by physiotherapy. The RCT found that both high-energy and low-energy ESWT significantly reduced pain and improved activities of daily living, range of motion, and power at 6 months compared with sham treatment (measured by Constant–Murley scores; mean: 31.0 [95% CI 26.7 to 35.3] with high-energy ESWT *v* 15.0 [95% CI 10.2 to 19.8] with low-energy ESWT *v* 6.6 [95% CI 1.4 to 11.8] with sham treatment; P less than 0.001 for both active treatments *v* sham treatment). The RCT also found similar improvements in pain with high- or low-energy ESWT at 3 and 12 months, as well as similar improvements in self-rated pain and radiographic changes at 3, 6, and 12 months.

The third RCT (90 people with clearly circumscribed and dense calcific tendonitis of 1 shoulder) also compared three interventions: high-energy ESWT at two levels ($E_1 = 0.15$ mJ/mm^2 or $E_2 = 0.44$ mJ/mm^2) and sham treatment. [65] Treatment was given at intervals of 6 weeks until symptoms resolved, five treatments had been given, or the participant withdrew from the trial. All participants receiving high-energy ESWT completed the trial. The trial did not directly compare ESWT versus sham treatment. It found that people receiving lower-level ESWT ($E_1 = 0.15$ mJ/mm^2) had significantly less pain during treatment but significantly more treatments than people receiving higher-level therapy ($E_2 = 0.44$ mJ/mm^2; P less than 0.001 for both outcomes). It found that people receiving lower-level ESWT had residual calcification and that 87% had recurrence of pain. People receiving high-level ESWT had no residual calcification or recurrence of pain. Sham treatment had no effect on resolution of calcification or reduction in pain.

The fourth RCT (46 people with calcific tendonitis of the rotator cuff) compared ESWT (2 treatments of ESWT 2 weeks apart: 2 mL of 2% lidocaine to subacromial space then 1000 acoustic pulses at 2/second with a power of $E = 0.15$ mJ/mm^2 followed by 48 hours of icing) versus sham ESWT (regimen as for ESWT but with sham ESWT treatment) and reported on pain (measured on a visual analogue scale [VAS] 0–10, where 0 = no pain and 10 = worst pain), Constant–Murley shoulder score (scored out of 100), and calcific deposits on anteroposterior (AP) radiograph. [66] Randomisation was based on a 2:1 allocation, which resulted in 33 people being allocated ESWT and 13 people being allocated the sham treatment. The RCT found that, compared with sham treatment, ESWT significantly improved pain at 6, 12, 26, and 52 weeks (results presented graphically; P less than 0.5 for all analysis), Constant shoulder score at 6, 12, 26, and 52 weeks (results presented graphically; P less than 0.5 for all analysis), but found no significant difference between groups in mean width of calcium deposits (results presented graphically, Constant score for Gartner type I and II deposits; P = 0.37). [66]

Non-calcific rotator cuff tendonopathy:
The first RCT (74 people with chronic non-calcifying rotator cuff tendonitis) found no significant difference between ESWT (1500 pulses at 0.12 mJ/mm^2) and sham treatment (3 sessions at monthly intervals) in shoulder pain or night pain at 3 or 6 months (improvement of 50% from baseline for ESWT versus sham ESWT at 3 months on the shoulder pain and disability index: OR 1.76, 95% CI 0.08 to 0.71; night pain: OR 0.94, 95% CI 0.65 to 1.36). [67] The RCT may have lacked power to exclude clinically important effects.

The second RCT (40 people with chronic supraspinatus tendonosis, 38 analysed) found no significant difference between ESWT (6000 pulses at 0.11 mJ/mm^2) and sham treatment (2 sessions weekly for 3 weeks) in function or pain at 12 weeks (difference treatment v control: pain at rest on 10-point VAS +1.4, 95% CI –1.0 to +3.9; pain during activity on 10-point scale: +2.50, 95% CI –0.81 to +3.33). [68] The RCT may have lacked power to exclude clinically important effects.

Harms: ESWT can be painful during treatment.

ESWT in people with non-specific shoulder pain:
We found no RCTs.

ESWT in people with acromioclavicular joint disease:
We found no RCTs.

ESWT in people with glenohumeral joint disease:
We found no RCTs.

ESWT versus placebo in people with rotator cuff disease:
Calcific tendonitis:
Small haematomas were reported in the first RCT, but the incidence was not stated and they could have been related to subcutaneous infiltration of local anaesthetic before treatment. [63] The second RCT found that 20/44 (45%) people receiving high-energy ESWT had moderate pain and 16/44 (36%) had severe pain during treatment. [64] It also found that 22/46 (49%) people receiving low-energy ESWT had moderate pain and 5/46 (11%) had severe pain; it reported no other adverse effects. People in the third RCT also developed haematomas of 2 cm or more (2 people having lower-level and 6 people having higher-level ESWT), but no other adverse effects were reported. [65] The fourth RCT reported pain, local irritation, and skin changes such as redness, bruising, swelling, and haematoma formation in people having ESWT with local erythematous reactions occurring in 3/33 (9%) of people with ESWT. [66]

Non-calcific rotator cuff tendonopathy:
In the first RCT, three people withdrew from the trial because of pain during treatment. [67] The second RCT gave no information on adverse effects. [68]

Comment: The mechanism of action of ESWT remains unclear. Technical factors and the dosing regimen of shock wave administration are likely to be important to clinical outcome. However, the first RCT found no significant difference between two sessions and a single session of ESWT in continued pain (91 people analysed; 23/49 [47%] with 2 sessions v 23/42 [55%] with 1 session; RR of continued pain 0.85, 95% CI 0.50 to 1.23). [63]

OPTION **LASER TREATMENT**

Symptom improvement
Laser treatment compared with placebo in people with glenohumeral joint disease Laser treatment may be more effective than sham laser at improving pain at 4, 8, and 16 weeks and shoulder function (measured by SPADI, Croft, DASH, HAQ scores) at up to 16 weeks in people with frozen shoulder, but we don't know whether it is more effective at improving range of shoulder motion at 4 to 16 weeks (low-quality evidence).

Laser treatment compared with placebo in people with rotator cuff disease Laser treatment may be more effective than sham laser at improving pain at 2 and 3 weeks and improving recovery rates (not further defined) at 4 weeks in people with tendonitis, but we don't know whether it is more effective at improving pain or shoulder abduction at 8 weeks (low-quality evidence).

Laser treatment compared with ultrasound in people with rotator cuff disease Laser treatment may be more effective than ultrasound at reducing pain at 2 weeks in people with subacromial impingement, but we don't know whether it is more effective at improving composite measures of function (measured by Constant–Murley or Simple Shoulder Test score) at 2 weeks (very low-quality evidence).

Note
We found no direct evidence from RCTs on the effects of laser treatment in people with non-specific shoulder pain or acromioclavicular joint disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Laser treatment in people with non-specific shoulder pain:**
We found no systematic review or RCTs.

Laser treatment in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Laser treatment versus placebo in people with glenohumeral joint disease:
We found no systematic review, but found one RCT. [69] The RCT (63 people with frozen shoulder) compared low-level laser treatment and sham laser treatment (twice-weekly sessions for 4 weeks followed by weekly sessions for 4 weeks) and reported on pain (measured on 100-mm visual analogue scale [VAS]), shoulder disability (Shoulder Pain and Disability Index [SPADI] consisting of 13 items, as well as the Croft shoulder disability questionnaire, which includes 22 items, and Health Assessment Questionnaire [HAQ], which includes 19 items), and functional activities and symptoms (DASH questionnaire, 30 items). The RCT found that, compared with sham laser, low-level laser treatment significantly improved pain at 4, 8, and 16 weeks (4 weeks: P less than 0.005; 8 weeks: P less than 0.05; 16 weeks: P less than 0.05), SPADI scores at 4, 8, and 16 weeks (P less than 0.05 for all analysis), Croft scores at 4 and 8 weeks (P less than 0.05), DASH score at 8 and 16 weeks (8 weeks; P less than 0.05; 16 weeks; P less than 0.005), and HAQ score at 4 and 8 weeks (P less than 0.05 for all analysis; all results presented graphically; absolute numbers not reported). [69] The RCT found no significant difference between groups in range of motion of shoulder at 4, 8, or 16 weeks (results presented graphically; absolute numbers and P value not reported; reported as not significant).

Laser treatment versus placebo in people with rotator cuff disease:
We found one systematic review (search date 2002, 4 RCTs) [70] and one additional RCT. [71] The first RCT identified by the review (35 people with rotator cuff tendonitis) found no significant difference between continuous irradiation laser and sham laser (10-minute sessions, twice weekly for 8 weeks) for pain or abduction at 8 weeks (pain on 10-cm VAS: improved by 3.6 cm with laser *v* 1.2 cm with placebo; P = 0.34; range of movement: improved by 36° with laser *v* 29° with placebo; P = 0.23). [72] The second RCT identified by the review (20 people with rotator cuff tendonitis) compared three treatments: low-level infrared laser (5 minutes, 3 times weekly, for 2 weeks), sham laser, and naproxen. It found that laser significantly reduced pain after 2 weeks compared with sham laser (pain score difference on 10-cm VAS: 2.5%, 95% CI 2.0% to 3.0%). [73] The third RCT identified by the review (24 people with supraspinatus tendonitis) found that low-level laser (9 treatments over a 3-week period) significantly improved pain at 3 weeks compared with sham laser (pain improved: 80% with laser *v* 20% with sham laser; P less than 0.05). [74] A fourth RCT identified by the review (40 people with shoulder periarthritis) compared 15 laser treatments with sham laser and is awaiting translation. [75] The additional RCT (91 people with rotator cuff tendonitis) found that laser significantly increased recovery rates at 1 month compared with placebo (42/47 [89%] with laser *v* 18/44 [41%] with placebo; ARR 48%, 95% CI 31% to 65%). [71]

Laser treatment versus ultrasound in people with rotator cuff disease:
We found no systematic review, but found one RCT. [76] The RCT (70 people with subacromial impingement) compared high-intensity laser treatment (10 sessions over 2 weeks) compared with ultrasound treatment (10 sessions over 2 weeks) and reported on pain (measured by 10-cm VAS), Constant–Murley Scale (CMS; 100-point scale based on pain, function, range of movement, and strength) and Simple Shoulder Test (SST; 12 questions on pain and function). The RCT found that high-intensity laser treatment significantly reduced pain at 2 weeks (P less than 0.01) but found no significant difference between groups in CMS score and SST score (reported as not significant; P value not reported). However, the RCT performed different statistical analyses and the significance of the between-group analyses varied by the exact statistical test performed. Outcomes were not reported beyond 2 weeks. [76]

Harms:

Laser treatment in people with non-specific shoulder pain:
We found no RCTs.

Laser treatment in people with acromioclavicular joint disease:
We found no RCTs.

Laser treatment versus placebo in people with glenohumeral joint disease:
The RCT did not report on adverse effects. [69]

Laser treatment versus placebo in people with rotator cuff disease:
None of the RCTs identified by the review assessed the adverse effects of laser treatment. [70]

Laser treatment versus ultrasound in people with rotator cuff disease:
The RCT did not report on adverse effects. [76]

Comment:
The quality of studies on the effects of laser treatment in shoulder disorders is limited by the lack of standardised approaches and short follow-up periods.

OPTION	PHYSIOTHERAPY (MANUAL TREATMENT, EXERCISES)

Symptom improvement

Physiotherapy compared with no treatment in people with non-specific shoulder pain Physiotherapy plus home exercises may be more effective than no treatment at improving recovery (defined as substantial improvement or recovered) and shoulder movement (abduction) at 4 weeks in people with mixed shoulder disorders, but we don't know whether it is more effective at improving pain or general function (low-quality evidence).

Physiotherapy compared with subacromial corticosteroid injection plus lidocaine in people with non-specific shoulder pain Physiotherapy may be more effective than subacromial corticosteroid injection plus lidocaine at reducing the proportion of people with the composite outcome of needing a repeat consultation or further intervention in people with new episodes of unilateral shoulder pain, but may be no more effective in reducing disability or increasing successful outcome at 6 months (low-quality evidence).

Physiotherapy compared with placebo or no treatment in people with glenohumeral joint disease Physiotherapy may be more effective than no physiotherapy at improving passive external rotation at 6 weeks in people with frozen shoulder, but we don't know whether it is more effective at improving pain or disability (measured by Shoulder Disability Questionnaire or global disability) or other shoulder movement (very low-quality evidence).

Physiotherapy compared with intra-articular corticosteroid injections in people with glenohumeral joint disease Physiotherapy may be less effective than intra-articular corticosteroid injections at improving pain and disability (measured by Shoulder Pain and Disability Index) at 6 weeks and treatment success (defined as recovered or much improved) at 7 and 52 weeks in people with frozen shoulder, but not at improving pain and disability at 52 weeks (very low-quality evidence).

Home exercises alone compared with oral corticosteroids plus home exercises in people with glenohumeral joint disease We don't know whether home exercises alone are more effective than oral corticosteroids plus home exercise at improving pain or function (range of abduction, flexion, and external rotation) at 8 months in people with frozen shoulder (low-quality evidence).

Physiotherapy compared with placebo or no treatment in people with rotator cuff disease Physiotherapy may be more effective than sham laser or no treatment at reducing pain and analgesic use and at improving function (measured by Neer scores, DASH 2, DASH 3, abduction, extension) in people with subacromial impingement/rotator cuff disease (low-quality evidence).

Physiotherapy compared with surgical arthroscopic decompression in people with rotator cuff disease We don't know whether supervised exercise is more effective than surgical arthroscopic decompression plus physiotherapy at improving Neer score (measuring pain, clinical testing of function, active range of movement, and anatomical or radiological examination) at 6 months to 2.5 years in people with rotator cuff disease (low-quality evidence).

Note
We found no direct evidence from RCTs on the effects of physiotherapy in people with acromioclavicular disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Physiotherapy versus no treatment in people with non-specific shoulder pain:**
We found one systematic review (search date 2002, [70] 1 RCT [77]). The RCT identified by the review (66 people with mixed shoulder disorders) found that physiotherapy plus home exercises significantly improved recovery and significantly reduced the proportion of people with worse shoulder abduction at 4 weeks, but found no significant difference between groups for function or pain (substantial improvement or recovered: 21/38 [55%] with physiotherapy *v* 2/28 [7%] with control; RR 7.74, 95% CI 1.97 to 30.32; worse abduction: 4/38 [11%] with physiotherapy *v* 9/28 [32%] with control; RR 0.33, 95% CI 0.11 to 0.96; no pain: 19/38 [50%] with physiotherapy *v* 9/28 [32%] with control; RR 1.56, 95% CI 0.83 to 2.91; good or excellent function: 27/38 [71%] with physiotherapy *v* 13/28 [32%] with control; RR 1.53, 95% CI 0.98 to 2.39). [70]

Physiotherapy versus subacromial corticosteroid injection plus lidocaine in people with non-specific shoulder pain:
See benefits of subacromial corticosteroid injections, p 12 .

Physiotherapy in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Physiotherapy versus placebo or no treatment in people with glenohumeral joint disease:
We found one systematic review (search date 2002, 1 RCT) [70] and one subsequent RCT. [44] The small RCT identified by the review (42 people with frozen shoulder and night pain) compared four treatments: subacromial plus intra-articular corticosteroid, Maitland mobilisation, ice therapy,

and no treatment. [78] It found no significant difference in pain or range of motion between treatment groups at 3 months (no data reported). The RCT may have lacked power to detect a clinically important difference. [78] The subsequent RCT (80 people with frozen shoulder of less than 6 months' duration) compared four interventions: injection of triamcinolone 20 mg versus placebo, with or without physiotherapy. [44] All participants were given an identical home-exercise programme. Outcome measures were assessed at 6 weeks and 16 weeks. The primary outcome measure was Shoulder Disability Questionnaire score. Secondary outcomes were measurement of pain using a visual analogue scale [VAS], global disability using a VAS, and range of passive external rotation. The RCT did not directly compare physiotherapy versus corticosteroid injection; instead, it performed a two-way analysis of variance to assess the effects of each intervention separately. It found that physiotherapy significantly improved passive external rotation at 6 weeks compared with no physiotherapy (18.7 with physiotherapy *v* 10.4 with no physiotherapy; P = 0.02), but there was no significant difference in other measured outcomes (P greater than 0.05). At 16 weeks, all groups had improved to a similar degree with respect to all outcome measures. [44]

Physiotherapy versus intra-articular corticosteroids in people with glenohumeral joint disease:
See benefits of intra-articular corticosteroids, p 9 .

Home exercise versus home exercise plus oral corticosteroids in people with glenohumeral joint disease:
See benefits of oral corticosteroids, p 3 .

Physiotherapy versus placebo or no treatment in people with rotator cuff disease:
We found one systematic review (search date 2002, 1 RCT) [70] and one subsequent RCT. [79] The RCT identified by the review (125 people with rotator cuff disease) compared three treatments: exercise supervised by an experienced physiotherapist plus home exercises plus pain management, arthroscopic decompression plus physiotherapy, and sham laser, over 6 weeks. [80] It found that physiotherapy significantly improved the Neer score compared with sham laser at 6 months (median Neer score: 86 with physiotherapy *v* 66 with sham laser; P less than 0.001). [80] Long-term follow-up of 110 people from the RCT found that physiotherapy significantly increased the success rate compared with sham laser at 2.5 years (success, defined as Neer score greater than 80: 27/44 [61%] with physiotherapy *v* 7/28 [25%] with sham laser; P less than 0.01). [81]

The subsequent RCT (60 people with subacromial impingement) compared progressive resistance training (twice weekly for 8 weeks) versus a control group receiving no physiotherapy treatment. [79] It measured pain (10-cm VAS), function (Disabilities of the Arm, Shoulder, and Hand [DASH] questionnaire — DASH 2 for laborious function, DASH 3 for activities of daily living, score 0–100 where 100 is worst state), and analgesic use. It found that, compared with control, exercise significantly improved pain at rest, pain on movement, DASH 2 and DASH 3 scores, analgesic use, and NSAID use at 8 weeks (baseline to 8 weeks: pain at rest: from 4.2 to 2.4 with exercise *v* from 3.9 to 4.3 with control; P = 0.001; pain at movement: from 7.4 to 5.2 with exercise *v* from 7.1 to 7.1 with control; P = 0.001; DASH 2: from 49.6 to 28.7 with exercise *v* from 47.4 to 44.2 with control; P = 0.007; DASH 3: from 44.0 to 33.2 with exercise *v* from 44.8 to 43.4 with control; P = 0.013; analgesic, average doses: 2.0 with exercise *v* 14.4 with control; P less than 0.041; NSAID, average doses: 1.9 with exercise *v* 17.4 with control; P less than 0.001). [79] The RCT also found that exercise significantly improved range of shoulder abduction (P = 0.001) and extension (P = 0.032), but found no significant difference between groups for other planes of motion. It found that exercise significantly improved quality of life compared with control (SF-36 questionnaire domains of physical function [P = 0.044], social function [P = 0.047], emotional role limitation [P = 0.036], and mental health [P = 0.037]). [79]

Physiotherapy versus arthroscopic subacromial decompression in people with rotator cuff disease:
See benefits of arthroscopic subacromial decompression, p 28 .

Harms:

Physiotherapy versus no treatment in people with non-specific shoulder pain:
The review [70] and RCT [77] gave no information on adverse effects.

Physiotherapy versus subacromial corticosteroid injection plus lidocaine in people with non-specific shoulder pain:
See harms of subacromial corticosteroid injections, p 12 .

Physiotherapy in people with acromioclavicular joint disease:
We found no RCTs.

Physiotherapy versus placebo or no treatment in people with glenohumeral joint disease:
The review [70] gave no information on adverse effects.

Physiotherapy versus intra-articular corticosteroids in people with glenohumeral joint disease:
See harms of intra-articular corticosteroids, p 9 .

Home exercise plus oral corticosteroids versus home exercise alone in people with glenohumeral joint disease:
See harms of oral corticosteroids, p 3 .

Physiotherapy versus placebo or no treatment in people with rotator cuff disease:
The review [70] gave no information on adverse effects. The subsequent RCT gave no information on adverse effects. [79]

Physiotherapy versus arthroscopic subacromial decompression in people with rotator cuff disease:
See harms of arthroscopic subacromial decompression, p 28 .

Comment: Studies on the effects of physiotherapy in shoulder disorders are limited by the lack of standardised approaches. Diverse forms of physiotherapy have been evaluated, and outcome measures and follow-up periods vary.

OPTION	ELECTRICAL STIMULATION

Symptom improvement
Electrical stimulation compared with sham electrical stimulation in people with non-specific shoulder pain Electrical stimulation may be no more effective than sham electrical stimulation at increasing the proportion of people with a large improvement (not further defined) at 6 weeks in people with deltoid pain not improved by six exercise sessions (very low-quality evidence).

Electrical stimulation compared with sham electrical stimulation in people with rotator cuff disease Electrical stimulation may be more effective than sham treatment at improving calcific tendonitis (not further defined) in people with symptomatic calcific tendonitis, but we don't know whether it is more effective in people with rotator cuff tendonitis (very low-quality evidence).

Note
We found no direct evidence from RCTs on the effects of electrical stimulation in people with acromioclavicular joint disease or glenohumeral joint disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Electrical stimulation versus sham electrical stimulation in people with non-specific shoulder pain:**
We found one systematic review (search date 2002, 1 RCT). [70] The RCT (180 people with pain over deltoid or reduced movement not improved by 6 exercise sessions) compared electrical stimulation (bipolar interferential electrical stimulation) with sham electrical stimulation, and compared pulsed ultrasound with sham ultrasound in a blinded two-by-two factorial design (see benefits of ultrasound, p 22). It found no significant difference in the proportion of people who reported a "large improvement" at 6 weeks (AR: 17/73 [23%] with electrical stimulation *v* 16/72 [22%] with control; ARR +1%, 95% CI −13% to +15%).

Electrical stimulation in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Electrical stimulation in people with glenohumeral joint disease:
We found no systematic review or RCTs.

Electrical stimulation versus sham electrical stimulation in people with rotator cuff disease:
We found one systematic review (search date 2002, 2 RCTs). [70] The first RCT identified by the review (60 people with symptomatic calcific tendinitis) found that pulsed electromagnetic field significantly improved calcific tendonitis at 6 weeks compared with sham treatment (see comment). The second RCT identified by the review (29 people with rotator cuff tendonitis not cured by corticosteroid injection) compared electrical stimulation induced by pulsed electromagnetic fields (5–9 hours/day for 4 weeks) versus placebo, but it did not report on clinical improvement or resolution.

Harms: **Electrical stimulation versus sham electrical stimulation in people with non-specific shoulder pain:**
The review gave no information on adverse effects. [70]

Electrical stimulation in people with acromioclavicular joint disease:
We found no RCTs.

Electrical stimulation in people with glenohumeral joint disease:
We found no RCTs.

Electrical stimulation in people with rotator cuff disease:
The review gave no information on adverse effects. [70]

Comment: The quality of studies on the effects of electrical treatments in shoulder disorders is limited by the lack of standardised approaches. We found no good evidence that different forms of electrical stimulation produce different effects. Further details of the outcomes in the second RCT identified by the review should be available when this RCT is translated. [83]

OPTION	ICE

Symptom improvement
Ice compared with other treatments or no treatment We don't know whether ice therapy is more effective than sub-acromial pus intra-articular corticosteroid injections, Maitland mobilisation, or no treatment at improving pain or range of motion at 3 months in people with frozen shoulder (very low-quality evidence).

Note
We found no direct evidence from RCTs on the effects of ice in people with non-specific shoulder pain, acromioclavicular joint disease, or rotator cuff disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Ice in people with non-specific shoulder pain:**
We found no systematic review or RCTs.

Ice in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Ice versus other treatments or no treatment in people with glenohumeral joint disease:
We found no systematic review, but found one small RCT (42 people with frozen shoulder and night pain), which compared four treatments: subacromial plus intra-articular corticosteroid, Maitland mobilisation, ice therapy, and no treatment. It found no significant difference in pain or range of motion between treatment groups at 3 months (no data reported). [78] However, the study may have lacked power to detect the clinically important effects of treatment.

Ice in people with rotator cuff disease:
We found no systematic review or RCTs.

Harms: **Ice in people with non-specific shoulder pain:**
We found no RCTs.

Ice in people with acromioclavicular joint disease:
We found no RCTs.

Ice versus other treatments or no treatment in people with glenohumeral joint disease:
The RCT gave no information on adverse effects. [78]

Ice in people with rotator cuff disease:
We found no RCTs.

Comment: None.

OPTION	ULTRASOUND

Symptom improvement
Ultrasound compared with placebo or no treatment in people with non-specific shoulder pain Ultrasound may be no more effective than no treatment or sham treatment at improving pain or function in people with non-specific shoulder pain, limited movement, or both (very low-quality evidence).

Ultrasound plus physiotherapy compared with placebo plus physiotherapy in people with glenohumeral disease We don't know whether ultrasound plus physiotherapy is more effective than placebo plus physiotherapy at reducing pain on motion or function (measured by Shoulder Pain and Disability Index score, physical component of SF-36 score) at 3 months in people with frozen shoulder (low-quality evidence).

Ultrasound compared with placebo or no treatment in people with rotator cuff disease We don't know whether ultrasound is more effective than placebo at reducing pain or improving treatment success or function (measured using Activities of Daily Living score) in people with rotator cuff disease (very low-quality evidence).

Ultrasound plus physiotherapy compared with placebo plus physiotherapy in people with rotator cuff disease We don't know whether ultrasound plus physiotherapy is more effective than placebo plus physiotherapy at improving pain or function at 15 days in people with rotator cuff disease (low-quality evidence).

Ultrasound compared with acupuncture in people with rotator cuff disease We don't know whether ultrasound is more effective than acupuncture at reducing pain, increasing success rate (defined as no need for corticosteroid injection), or increasing the range of abduction at 4 weeks in people with rotator cuff lesions (very low-quality evidence).

Ultrasound plus physiotherapy compared with acupuncture plus physiotherapy in people with rotator cuff disease We don't know whether ultrasound plus physiotherapy is more effective than acupuncture plus physiotherapy at improving outcomes (measured by Constant–Murley score, Adolfsson–Lysholm score, or University of California at Los Angeles End-Result score) at 5, 12, 24, or 52 weeks in people with subacromial impingement (very low-quality evidence).

Ultrasound compared with laser treatment in people with rotator cuff disease Ultrasound may be less effective than laser treatment at reducing pain at 2 weeks in people with subacromial impingement, but we don't know about composite measures of function (measured by Constant–Murley or Simple Shoulder Test score) at 2 weeks (very low-quality evidence).

Note
We found no direct evidence from RCTs on the effects of ultrasound in people with acromioclavicular joint disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits:	**Ultrasound versus placebo or no treatment in people with non-specific shoulder pain:** We found one systematic review (search date 2002, [70] 2 RCTs [84] [85]). The first RCT identified by the review (180 people with either pain over deltoid on movement or reduced range of shoulder movement, who had failed to respond to 6 sessions of exercise) compared five treatments: pulsed ultrasound, sham ultrasound, bipolar interferential electrical stimulation, sham electrical stimulation, and sham electrical stimulation plus sham ultrasound. [84] The RCT assessed recovery using a 7-point Likert scale scored from "very large improvement, including recovery" to "very much worse". It found no significant difference in the proportion rating themselves as "very large improvement" between ultrasound and either no treatment or sham ultrasound at 6 weeks (26% with ultrasound *v* 19% with sham ultrasound; difference +7%, 95% CI –7% to +20%; 26% with ultrasound *v* 20% with no treatment; difference +6%, 95% CI –16% to +17%). Similarly, it found no significant difference between ultrasound and control in functional status, pain, or range of movement after 12 months. [84] The second RCT identified by the review (20 people with shoulder pain and limited movement for more than 1 month) found similar proportions of people with either minimal or no pain after 4 weeks with ultrasound (1 MHz, 1.2 W/cm^2, for 6 minutes) compared with sham ultrasound, although the study may have lacked power to detect clinically important effects (7/11 [64%] with ultrasound *v* 4/9 [44%] with placebo; P value not reported). [85] **Ultrasound in people with aromioclavicular joint disease:** We found no systematic review or RCTs. **Ultrasound plus physiotherapy versus placebo plus physiotherapy in people with glenohumeral joint disease:** We found no systematic review, but found one RCT. [86] The RCT (49 people with frozen shoulder) compared true ultrasound treatment (continuous ultrasound; frequency 3 MHz; intensity 1.5 W/cm^2) versus sham ultrasound treatment, each given for 10 minutes on 10 occasions over 2 weeks in addition to heat treatment and physical exercises, and reported on pain with motion (measured on visual analogue scale [VAS], score 0–100 where 100 is worst), Shoulder Pain and Disability Index scores (SPADI; measures pain and disability, score 0–100 where 100 is worst), and the physical component of the SF-36 questionnaire (score 0–100 where 100 is worst). The RCT found no significant difference between ultrasound and sham ultrasound in pain with motion, SPADI score, or SF-36 score at 3 months (pain scores: 24.8 with ultrasound *v* 23.6 with sham ultrasound; P = 0.83; SPADI total score: 30.0 with ultrasound *v* 25.5 with sham ultrasound; P = 0.45; SF-36 physical: 44.2 with ultrasound *v* 44.6 with sham ultrasound; P = 0.83). [86]

Ultrasound versus placebo or no treatment in people with rotator cuff disease:
We found one systematic review (search date 2002, [70] 3 RCTs [87] [88] [89]). The first RCT identified by the review (70 shoulders in 63 people with calcific tendonitis) compared pulsed ultrasound (frequency 890 Hz; intensity 2.5 W/cm^2; pulsed mode 1:4) versus sham treatment over the area of calcification. [87] The first 15 treatments were given daily (5 times weekly) and the remainder three times weekly for 3 weeks. The treating therapist was blind to treatment allocation. Nine people (9 shoulders) did not complete the treatment: three in the ultrasound group and six in the sham group, two in the sham group because of pain. The RCT found that ultrasound significantly improved pain and quality of life at the end of treatment (6 weeks) but found no significant difference at 9 months (6 weeks: mean improvement in 15-point pain score: 6.4 with ultrasound v 1.6 with sham ultrasound; P less than 0.001; mean improvement in 10-point quality-of-life score: 2.6 with ultrasound v 0.4 with sham ultrasound; P = 0.002; 9 months: mean improvement in 15-point pain score: 5.7 points with ultrasound v 4.0 points with sham ultrasound; P = 0.23; mean improvement in 10-point quality-of-life score: 2.4 with ultrasound v 1.9 with sham ultrasound; P = 0.52). [87]

The second RCT identified by the review (60 people with rotator cuff lesions) compared five treatments: ultrasound (no details reported), tolmetin plus methylprednisolone plus lidocaine, methylprednisolone plus lidocaine, acupuncture, and placebo. [88] It found no significant difference between ultrasound and placebo in pain or treatment success at 4 weeks, although the study may have lacked power to detect clinically important differences (mean pain score on a 100-mm VAS from baseline to 4 weeks: from 48.2 to 41.2 with ultrasound v from 52.2 to 22.0 with placebo; P value not reported). [88]

The third RCT identified by the review (61 people with rotator cuff disease without tear) found no significant difference between pulsed ultrasound (1.0 MHz, on:off ratio 1:4, intensity 1.0 W/cm^2, 10 minutes) and placebo in pain or function after 12 months (difference in pain scored using index from 1 to 5, no further details: +0.1, 95% CI –0.1 to +0.3; difference in function using the Activities of Daily Living index scored from 2 to 10, no further details reported: –0.2, 95% CI –0.5 to +0.1). [89] However, the RCT is likely to have been underpowered to detect a clinically important difference between groups.

Ultrasound plus physiotherapy versus placebo plus physiotherapy in people with rotator cuff disease:
We found one systematic review (search date 2006, 1 RCT). [54] The RCT (38 people with rotator cuff disease) identified by the review compared ultrasound (continuous ultrasound; frequency 1 MHz; intensity 1.5 W/cm^2) versus sham ultrasound treatment, each given on 15 occasions over 3 weeks with heat treatment and physical exercises, and reported on pain (Likert scale 0–3 where 3 is worst pain), range of motion (ROM), activities of daily living (Health Assessment Questionnaire [HAQ]), and shoulder disability (Shoulder Disability Questionnaire [SDQ]). [90] The RCT found no significant difference between ultrasound and sham ultrasound for improvement in pain, ROM, HAQ scores, or SDQ scores at 15 days (improvement 0–21 days; pain at rest: 0.7 with ultrasound v 0.5 with sham; P = 0.36; pain with motion: 0.4 with ultrasound v 0.6 with sham ultrasound; P = 0.21; passive and active ROM, 10 measures: P values ranged from 0.28 to 0.87; HAQ scores: 0.6 with ultrasound v 0.8 with sham ultrasound; P = 0.27; SDQ score: 34.5 with ultrasound v 36.7 with sham ultrasound; P = 0.71). [90]

Ultrasound versus acupuncture in people with rotator cuff disease:
We found one systematic review (search date 2003, 1 RCT). [91] The RCT (60 people with rotator cuff lesions) identified by the review compared five treatments: ultrasound (no details reported), tolmetin plus methylprednisolone plus lidocaine, methylprednisolone plus lidocaine, acupuncture, and placebo. The review found no significant difference between acupuncture and ultrasound in pain, range of abduction, or success rate at 4 weeks (24 people in analysis; pain: mean difference –7.10, 95% CI –32.9 to +18.70; units not defined; range of abduction: mean difference +7.9, 95% CI –21.59 to +37.39, units not defined; success rate short term [no need for follow-up corticosteroid injection]: 5/12 [42%] with acupuncture v 6/12 [50%] with ultrasound; RR 0.83, 95% CI 0.35 to 2.00). [91] The RCT had inadequate allocation concealment.

Ultrasound plus physiotherapy versus acupuncture plus physiotherapy in people with rotator cuff disease:
We found one RCT. [92] The RCT (85 people with subacromial impingement) compared ultrasound treatment (continuous ultrasound; frequency 1 MHz; intensity 1 W/cm^2) versus acupuncture (as described in a Swedish manual with 4 local points and 1 distal point) each performed twice weekly for 5 weeks, and both groups also received physiotherapy for 5 weeks. In total, over the 12-month assessment period, nine people in the acupuncture group and eight people in the ultrasound group received additional treatments. When intention-to-treat analysis (using last observation carried forward) was performed, the RCT found no significant difference between groups in Constant–Murley shoulder scores, Adolfsson–Lysholm shoulder scores, or University of California at Los Angeles

End-Result scores, after 5 weeks and at 3, 6, and 12 months (mean scores for all 4 assessment visits; absolute numbers and P values not reported; reported as not significant). [92]

Ultrasound versus laser treatment in people with rotator cuff disease:
See benefits of laser treatment, p 17 .

Harms: **Ultrasound versus placebo or no treatment in people with non-specific shoulder pain:**
None of the RCTs identified by the review assessed the adverse effects of ultrasound. [70]

Ultrasound in people with acromioclavicular joint disease:
We found no RCTs.

Ultrasound plus physiotherapy versus placebo plus physiotherapy in people with gleno-humeral joint disease:
The RCT did not report on adverse effects. [86]

Ultrasound versus placebo or no treatment in people with rotator cuff disease:
None of the RCTs identified by the review assessed the adverse effects of ultrasound. [70]

Ultrasound plus physiotherapy versus acupuncture plus physiotherapy in people with rotator cuff disease:
The RCT did not report on adverse effects. [90]

Ultrasound versus acupuncture in people with rotator cuff disease:
The review did not report on adverse effects. [91]

Ultrasound plus physiotherapy versus acupuncture plus physiotherapy in people with rotator cuff disease:
The RCT reported that no adverse effects were reported in either group. [92]

Ultrasound versus laser treatment in people with rotator cuff disease:
See harms of laser treatment, p 17 .

Comment: There was considerable heterogeneity of the groups, interventions, and follow-up duration among the RCTs. It is not clear whether ultrasound machines were always adequately calibrated before use.

| OPTION | ACUPUNCTURE | New |

Symptom improvement
Acupuncture compared with placebo in people with non-specific shoulder pain Acupuncture may be more effective than sham acupuncture at decreasing pain and improving function (measured by range of motion, Shoulder Pain and Disability Index global score) at 7, 12, and 24 weeks in people with non-specific shoulder pain, but we don't know whether it is more effective for overall improvement (in response to the question "how much have you improved?") at 4 weeks (very low-quality evidence).

Acupuncture compared with placebo in people with rotator cuff disease Acupuncture may be no more effective than placebo at improving pain, success rate (defined as no need for follow-up corticosteroid injection), or range of abduction at 4 weeks in people with rotator cuff lesions (very low-quality evidence).

Acupuncture compared with ultrasound in people with rotator cuff disease We don't know whether acupuncture is more effective than ultrasound at reducing pain, increasing success rate (defined as no need for corticosteroid injection), or increasing the range of abduction at 4 weeks in people with rotator cuff lesions (very low-quality evidence).

Acupuncture plus physiotherapy compared with ultrasound plus physiotherapy in people with rotator cuff disease We don't know whether acupuncture plus physiotherapy is more effective than ultrasound plus physiotherapy at improving outcomes (measured by Constant–Murley score, Adolfsson–Lysholm score, or University of California at Los Angeles End-Result score) at 5, 12, 24, or 52 weeks in people with subacromial impingement (very low-quality evidence).

Note
We found no direct evidence from RCTs on the effects of acupuncture in people with acromioclavicular joint disease or glenohumeral joint disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits:

Acupuncture versus placebo in people with non-specific shoulder pain:
We found one systematic review (search date 2003, [91] 1 RCT [93]) and one subsequent RCT. [94] The RCT (42 people with shoulder pain) identified by the review reported found no significant difference between acupuncture and sham acupuncture (both once-weekly for 3 weeks) for improvement at 4 weeks (average post-treatment improvement rating, in answer to question "how much have you improved?": 23% with acupuncture *v* 39% with placebo; reported as no significant difference; P value not reported). [91] The method of randomisation was not reported, allocation concealment was unclear, and, in addition, half the interventions in each group were given in a "positive setting" and half were given in a "negative setting". [91]

The subsequent RCT (130 people with non-specific shoulder pain) compared electro-acupuncture (using the same 2 local and 2 distal acupuncture points for each person) versus sham electro-acupuncture both once-weekly for 8 weeks. [94] The RCT found that, compared with sham acupuncture, acupuncture significantly improved pain (measured by 10-cm visual analogue scale [VAS]), range of motion, Shoulder Pain and Disability Index scores (SPADI global score), and diclofenac use at 7 weeks, 3 months, and 6 months (6 months: pain: mean difference 2.0, 95% CI 1.2 to 2.9; range of motion: mean difference 38.1°, 95% CI 26.5° to 49.7°; SPADI global index: mean difference 22.1; CI unclear; P less than 0.0005; mean consumption of diclofenac: 3 tablets/week with acupuncture *v* 8 tablets/week with placebo; reported as significant; P value not reported). [94] Results were based on 110/130 (85%) people randomised.

Acupuncture in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Acupuncture in people with glenohumeral joint disease:
We found no systematic review or RCTs.

Acupuncture versus placebo in people with rotator cuff disease:
We found one systematic review (search date 2003, 1 RCT). [91] The RCT identified by the review (60 people with rotator cuff lesions) compared five treatments: ultrasound (no details reported), tolmetin plus methylprednisolone plus lidocaine, methylprednisolone plus lidocaine, acupuncture, and placebo. The review found no significant difference between acupuncture and placebo in pain, range of abduction, or short-term success rate at 4 weeks (24 people in analysis: pain: mean difference +12.10, 95% CI −10.23 to +34.43, units not specified; range of abduction: mean difference −17.30, 95% CI −44.11 to +9.51, units not specified; success rate short term [no need for follow-up corticosteroid injection]: 5/12 [50%] with acupuncture *v* 9/12 [75%] with placebo; RR 0.56, 95% CI 0.26 to 1.17). [91] The RCT had inadequate allocation concealment and may have been too small to detect clinically important differences between groups.

Acupuncture versus ultrasound in people with rotator cuff disease:

Acupuncture plus physiotherapy versus ultrasound plus physiotherapy in people with rotator cuff disease:

Harms:

Acupuncture versus placebo in people with non-specific shoulder pain:
The RCT identified by the review did not report on adverse effects. [91] The subsequent RCT reported incidence of fainting (2 people with acupuncture), dizziness (3 people with acupuncture), dyspepsia (1 person with acupuncture *v* 4 people with control), anxiety reaction (1 person with acupuncture *v* 2 with control), and bruising (5 people with acupuncture; statistical analysis between groups not reported). [94]

Acupuncture in people with acromioclavicular joint disease:
We found no RCTs.

Acupuncture in people with glenohumeral joint disease:
We found no RCTs.

Acupuncture versus placebo in people with rotator cuff disease:
The RCT identified by the review did not report on adverse effects. [91]

Acupuncture versus ultrasound in people with rotator cuff disease:

Acupuncture plus physiotherapy versus ultrasound plus physiotherapy in people with rotator cuff disease:
See harms of ultrasound, p 22 .

Comment: There is a large degree of heterogeneity of methodology between studies in terms of groups, interventions, outcome measures, and follow-up assessment timing.

QUESTION   What are the effects of surgical treatment in people with shoulder pain?

OPTION   MANIPULATION UNDER ANAESTHESIA

Symptom improvement
Manipulation under anaesthesia plus intra-articular hydrocortisone injection compared with intra-articular hydrocortisone injection alone in people with glenohumeral joint disease Manipulation under anaesthesia plus intra-articular hydrocortisone injection may be more effective than intra-articular hydrocortisone injection alone at increasing recovery rates (defined as no disability) at 3 months in people with frozen shoulder (low-quality evidence).

Manipulation under anaesthesia plus physiotherapy compared with intra-articular corticosteroid injection plus physiotherapy in people with glenohumeral disease We don't know whether manipulation under anaesthesia plus physiotherapy is more effective than intra-articular corticosteroid injection plus physiotherapy at reducing pain (measured by visual analogue scale) or overall shoulder scores (measured by Constant–Murley shoulder score) at 16 weeks or overall health scores (measured by SF-36) at 2 years in people with frozen shoulder (very low-quality evidence).

Note
Potential adverse effects of manipulation under anaesthesia include intra-articular lesions within the glenohumeral joint. We found no direct evidence from RCTs on the effects of manipulation under anaesthesia in people with non-specific shoulder pain, acromioclavicular joint disease, or rotator cuff disease, and found no direct evidence from RCTs comparing the effects of manipulation under anaesthesia alone versus placebo in people with glenohumeral disease.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Manipulation in people with non-specific shoulder pain:**
We found no systematic review or RCTs.

Manipulation in people with acromioclavicular joint disease:
We found no systematic review or RCTs.

Manipulation plus intra-articular hydrocortisone injection versus intra-articular hydrocortisone injection alone in people with glenohumeral joint disease:
We found one RCT. [95] The RCT (30 people with frozen shoulder) found that manipulation under anaesthesia plus intra-articular hydrocortisone injection significantly increased recovery rates compared with intra-articular hydrocortisone injection alone at 3 months (recovery, defined as no disability: 7/15 [47%] with forced manipulations *v* 2/15 [13%] with control; ARI 33%, 95% CI 1% to 65%). [95]

Manipulation under anaesthesia plus physiotherapy versus intra-articular corticosteroid injection plus physiotherapy in people with glenohumeral joint disease:
See benefits of intra-articular corticosteroid injection, p 9 .

Manipulation in people with rotator cuff disease:
We found no systematic review or RCTs.

Harms: **Manipulation in people with non-specific shoulder pain:**
We found no RCTs.

Manipulation in people with acromioclavicular joint disease:
We found no RCTs.

Manipulation plus intra-articular hydrocortisone injection versus intra-articular hydrocortisone injection alone in people with glenohumeral joint disease:
The RCT gave no information on adverse effects. [95] A further prospective study (30 people with frozen shoulder) assessed intra-articular lesions in people having arthroscopy after manipulation under general anaesthesia. [96] After manipulation, all participants had a haemarthrosis. In 22/30 (73%) people, localised synovitis was detected in the area of the rotator interval; in 8/30 (27%) people, disseminated synovitis was seen (a feature of frozen shoulder); in 11/30 (37%) people, the capsule was ruptured superiorly; in 24/30 (80%) people, the anterior capsule was ruptured up

to the infraglenoid pole; and 16/30 (53%) people had a capsular lesion located posteriorly. In 18/30 (60%) people, no additional joint damage was found after manipulation. In 4/30 (13%) people, iatrogenic superior labrum anterior–posterior lesions were observed. Further injuries detected were three fresh partial tears of the subscapularis tendon, four anterior labral detachments (1 with a small osteochondral defect), and two tears of the middle glenohumeral ligament. Even though manipulation under anaesthesia is effective in terms of joint mobilisation, it can cause iatrogenic intra-articular damage.

Manipulation under anaesthesia plus physiotherapy versus intra-articular corticosteroid injection plus physiotherapy in people with glenohumeral joint disease:
See harms of intra-articular corticosteroid injection, p 9 .

Manipulation in people with rotator cuff disease:
We found no RCTs.

Comment: We found a second, low-quality, possible RCT (98 people with frozen shoulder) comparing three interventions: manipulation under anaesthesia (MUA) alone, MUA plus intra-articular injection of methylprednisolone, and MUA plus intra-articular injection of saline. [97] All participants had physiotherapy after manipulation. It is unclear whether the trial was randomised because details of randomisation were not reported. Ten people (12 shoulders) were lost to follow-up, and results were not analysed by intention to treat, and the trial did not assess the significance of the difference in outcomes among groups. A good result (observer rated) was defined as improvement in active range of motion, pain relief, and return to normal activities. The RCT found that more shoulders having MUA plus intra-articular injection of saline than under other treatments had a good result at 6 to 8 months (88 shoulders: 25/29 [86%] shoulders with MUA plus intra-articular injection of saline *v* 14/28 [50%] shoulders with MUA plus intra-articular injection of methylprednisolone *v* 13/29 [45%] shoulders with MUA alone; significance not assessed). In the study, 2/88 (2%) people having MUA sustained an undisplaced fracture of the surgical neck of the humerus and 2/88 (2%) sustained an anterior dislocation of the glenohumeral joint. [97]

OPTION	ARTHROSCOPIC SUBACROMIAL DECOMPRESSION

Symptom improvement
Arthroscopic subacromial decompression compared with sham laser in people with rotator cuff disease Arthroscopic subacromial decompression plus physiotherapy may be more effective than sham laser at improving Neer score (measuring pain, clinical testing of function, active range of movement, and anatomical or radiological examination) at 6 months to 2.5 years in people with rotator cuff disease (low-quality evidence).

Arthroscopic subacromial decompression compared with physiotherapy in people with rotator cuff disease We don't know whether arthroscopic subacromial decompression plus physiotherapy is more effective than supervised exercises at improving Neer score (measuring pain, clinical testing of function, active range of movement, and anatomical or radiological examination) at 6 months to 2.5 years in people with rotator cuff disease (low-quality evidence).

Arthroscopic rotator cuff repair plus arthroscopic subacromial decompression compared with rotator cuff repair without arthroscopic subacromial decompression in people with rotator cuff disease We don't know whether arthroscopic rotator cuff repair plus arthroscopic subacromial decompression is more effective than arthroscopic rotator cuff repair without arthroscopic subacromial decompression at improving composite outcomes of pain and function (measured by Constant–Murley score, American Shoulder and Elbow Surgeons shoulder score, DASH, and work-DASH scores) in people with repairable full-thickness supraspinatus tendon or rotator cuff tears and a type II or III acromion (low-quality evidence).

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: **Arthroscopic subacromial decompression in people with non-specific shoulder pain:**
We found no systematic review or RCTs.

Arthroscopic subacromial decompression in people with acromiocalcivular joint disease:
We found no systematic review or RCTs.

Arthroscopic subacromial decompression in people with glenohumeral joint disease:
We found no systematic review or RCTs.

Arthroscopic subacromial decompression versus sham laser in people with rotator cuff disease:
We found one systematic review (search date 2006, [82] 1 RCT [80]). The RCT (125 people with rotator cuff disease) identified by the review compared three treatments: arthroscopic subacromial decompression by experienced surgeons plus physiotherapy, exercise supervised by experienced

physiotherapist plus home exercises plus pain management, and sham laser for 6 weeks. [80] It found that surgery significantly improved Neer score compared with sham laser at 6 months (median Neer score: 87 with surgery *v* 66 with sham laser; P less than 0.001). [80] Long-term follow-up of 110 people in the RCT found that surgery significantly increased the success rate compared with sham laser at 2.5 years (success, defined as Neer score greater than 80: 26/38 [68%] with surgery *v* 7/28 [25%] with sham laser; OR 6.6, 95% CI 2.0 to 21.3). [81]

Arthroscopic subacromial decompression versus physiotherapy in people with rotator cuff disease:
We found one systematic review (search date 2006, [82] 1 RCT [80]). The RCT identified by the review (125 people with rotator cuff disease) found no significant difference in Neer score between arthroscopic subacromial decompression and supervised exercises at 6 months (median Neer score: 87 with surgery *v* 86 with exercises; difference +4.0, 95% CI –2 to +11). [80] Long-term follow-up of 110 people found no significant difference in success rates at 2.5 years (success, defined as Neer score greater than 80: 26/38 [68%] with surgery *v* 27/44 [61%] with physiotherapy; OR 1.3, 95% 0.8 to 2.2). [81]

Arthroscopic rotator cuff repair with and without arthroscopic subacromial decompression in people with rotator cuff disease:
We found one systematic review (search date 2006, [82] 1 RCT [98]) and one subsequent RCT. [99] The RCT identified by the review (93 people with full-thickness tears limited to the supraspinatus tendon and a type II acromion) compared arthroscopic rotator cuff repair with arthroscopic subacromial decompression versus rotator cuff repair without arthroscopic subacromial decompression. [98] It found no significant difference in patient-assessed pain or function between groups after surgery (measured by American Shoulder and Elbow Surgeons shoulder scores; mean: 91.5 with subacromial decompression *v* 89.2 without subacromial decompression; P = 0.392).

The subsequent RCT (80 people with a full-thickness rotator cuff tear and a type II or III acromion) compared arthroscopic rotator cuff repair plus arthroscopic subacromial decompression (anteroinferior acromioplasty, division of the coracoacromial ligament and bursectomy) versus arthroscopic rotator cuff repair plus bursectomy only, with both groups following the same postoperative rehabilitation programme. [99] The RCT performed a univariate and multivariate analysis. It found no significant difference between the groups for Constant–Murley shoulder score; Disabilities of Arm, Shoulder, and Hand Questionnaire (DASH) scores; and work-DASH scores at 2 years following surgery (univariate analysis, reported as subacromial decompression did not significantly influence the outcome significantly for each scoring system; Constant–Murley score: P = 0.106; DASH score: P = 0.272; work-DASH: P = 0.680). [99]

Harms:
Arthroscopic subacromial decompression in people with non-specific shoulder pain:
We found no RCTs.

Arthroscopic subacromial decompression in people with acromioclavicular joint disease:
We found no RCTs.

Arthroscopic subacromial decompression in people with glenohumeral joint disease:
We found no RCTs.

Arthroscopic subacromial decompression versus sham laser in people with rotator cuff disease:
The RCT did not report on adverse effects. [80]

Arthroscopic subacromial decompression versus physiotherapy in people with rotator cuff disease:
The RCT did not report on adverse effects. [80]

Arthroscopic rotator cuff repair with and without arthroscopic subacromial decompression in people with rotator cuff disease:
The RCTs gave no information on adverse effects. [98] [99]

Comment: None.

| OPTION | SHOULDER ARTHROPLASTY | New |

We found no direct information from RCTs about the effects of shoulder arthroplasty in people with shoulder pain.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: We found no systematic review or RCTs of arthroplasty in people with shoulder pain.

Harms: We found no RCTs.

Comment: None.

OPTION	ROTATOR CUFF REPAIR	New

We found no direct information from RCTs about the effects of rotator cuff repair in people with shoulder pain.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: We found one systematic review (search date 2006), which found no RCTs of rotator cuff repair in people with shoulder pain. [82]

Harms: We found no RCTs.

Comment: None.

OPTION	EXCISION OF DISTAL CLAVICLE	New

We found no direct information from RCTs about the effects of excision of distal clavicle in people with shoulder pain.

For GRADE evaluation of interventions for shoulder pain, see table, p 34 .

Benefits: We found no systematic review or RCTs of excision of distal clavicle in people with shoulder pain.

Harms: We found no RCTs.

Comment: None.

GLOSSARY

Maitland mobilisation A graded system of manipulations and exercises intended to increase mobility of specific joints.

Shoulder pain and disability index (SPADI) A self administered instrument for measuring pain (5 items) and disability (8 items).

Interferential electrical stimulation Typically, a high-frequency current (4000 Hz) amplitude modulated at a lower frequency (60–100 Hz) given in bursts of 4 seconds and repeated for up to 15 minutes.

Low-quality evidence Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

Neer score Assesses pain during the past week, clinical testing of shoulder function, active range of movement, and anatomical or radiological examination. Scores range from 0 to 100 points.

Very low-quality evidence Any estimate of effect is very uncertain.

SUBSTANTIVE CHANGES

Autologous whole blood injections New option. We found no RCTs. Autologous whole blood injections categorised as Unknown effectiveness.

Platelet-rich plasma injections New option. We found one small RCT (40 people) comparing the effects of open subacromial decompression plus platelet-rich plasma injection versus open subacromial decompression without platelet-rich plasma injection in people with rotator cuff disease. [62] The small RCT found evidence of benefit in terms of pain and function at between 2 and 12 weeks, but not in shoulder instability. We found no further RCTs in people with non-specific shoulder pain, acromioclavicular joint disease, or glenohumeral joint disease. Plasma-rich platelet injections categorised as Unknown effectiveness.

Acupuncture New option. One systematic review (search date 2003) added, which included one RCT (60 people) comparing the effects of acupuncture versus ultrasound in people with rotator cuff disease. [91] The RCT found no significant difference between groups in pain, range of abduction, or success rate at 4 weeks. One RCT (85 people) added comparing acupuncture plus physiotherapy versus ultrasound treatment plus physiotherapy in people with subacromial impingement. [92] The RCT found no significant difference between groups in terms of composite shoulder scores. One systematic review (search date 2003) added, [91] which included one RCT (42 people) [93] and one subsequent RCT (130 people), [94] which compared the effects of acupuncture versus placebo in people with

non-specific shoulder pain. The larger RCT found some evidence of benefit with acupuncture in terms of improvement in pain and function, while the other RCT found no significant difference between groups with regard to overall improvement, but this RCT was of low methodological quality. The systematic review also included one small RCT (24 people) comparing the effects of acupuncture versus placebo in people with rotator cuff disease. The RCT found no evidence of benefit with acupuncture in terms of pain or function at 4 weeks, but may have been too small to detect clinically important differences between groups. Acupuncture categorised as Unknown effectiveness.

Shoulder arthroplasty New option. We found no RCTs. Categorised as Unknown effectiveness.

Rotator cuff repair New option. We found no RCTs. Categorised as Unknown effectiveness.

Excision of distal clavicle New option. We found no RCTs. Categorised as Unknown effectiveness.

Corticosteroids (oral) One systematic review added (search date 2005), [29] which found two small RCTs comparing oral corticosteroids versus placebo, which were already reported in this *Clinical Evidence* review. No new data added. The review also found three small RCTs comparing oral corticosteroids plus home exercises versus home exercises alone (40 people), oral corticosteroids plus manipulation under anaesthesia plus intra-articular injection of corticosteroid versus manipulation under anaesthesia plus intra-articular injection of corticosteroid manipulation alone (30 people), and oral corticosteroid plus physiotherapy versus intra-articular injection of corticosteroid plus physiotherapy (28 people). [29] The first RCT had been previously reported in this *Clinical Evidence* review; the second RCT found no consistent differences between groups; the third RCT only reported outcomes up to 3 weeks. Categorisation unchanged (Unknown effectiveness).

Extracorporeal shock wave therapy One small RCT (46 people) comparing extracorporeal shock wave therapy (ESWT) versus sham ESWT in people with calcific tendonitis. [66] The RCT found similar results to three previously reported larger RCTs of benefits with regard to pain and function with ESWT. Categorisation unchanged (Likely to be beneficial).

Intra-articular corticosteroid injections One RCT (53 people) added comparing intra-articular corticosteroid injections plus physiotherapy versus manipulation under anaesthesia plus physiotherapy in people with glenohumeral joint disease. [48] The RCT found no significant differences between groups in pain or function at 16 weeks. One systematic review (search date 2005) [29] added, which found one small RCT (28 people) [34] comparing intra-articular injection of corticosteroids plus physiotherapy versus oral corticosteroids plus physiotherapy in people with glenohumeral joint disease, which only reported outcomes at 3 weeks. Categorisation unchanged (Unknown effectiveness).

Laser treatment We found one RCT (63 people) comparing the effects of low-level laser treatment versus sham laser treatment in people with frozen shoulder. The RCT found evidence of benefit in terms of pain and composite outcomes of disability up to 16 weeks, but no difference in range of shoulder movement. [69] We found one RCT (70 people) comparing high-intensity laser treatment versus ultrasound treatment. [76] The RCT found some evidence of benefit with laser in terms of pain at 2 weeks, but no difference between groups in composite scores of pain and function. Categorisation unchanged (Likely to be beneficial).

Subacromial corticosteroid injections One RCT (56 people) added comparing subacromial injection of methylprednisolone plus lidocaine versus injection of lidocaine alone. [59] The RCT found similar results to four previously reported RCTs. One systematic review added (search date 2006), [54] which identified one RCT previously reported in this *Clinical Evidence* review comparing subacromial methylprednisolone plus lidocaine versus physiotherapy. No new data added. One further RCT added to comments as background data. [61] Categorisation unchanged (Unknown effectiveness).

Ultrasound We found one RCT comparing ultrasound treatment versus high-intensity laser treatment in people with rotator cuff disease. [76] The RCT found some evidence of benefit with laser in terms of pain at 2 weeks, but no difference between groups in composite scores of pain and function. We found one RCT (49 people) comparing ultrasound treatment plus physiotherapy versus sham ultrasound treatment plus physiotherapy, in addition to heat treatment and physical exercises, in people with glenohumeral joint disease. [86] The RCT found no significant difference between groups in terms of pain or shoulder disability scores. We found one small RCT (38 people) comparing ultrasound plus physiotherapy versus sham ultrasound treatment plus physiotherapy in people with rotator cuff disease. [90] The RCT found no significant difference between groups in pain, disability scores, or range of movement at 21 days. One systematic review (search date 2003) added, which included one RCT (60 people) comparing ultrasound versus acupuncture in people with rotator cuff disease. [91] The RCT found no significant difference between groups in pain, range of abduction, or success rate at 4 weeks. We found one RCT (85 people) comparing ultrasound treatment plus physiotherapy versus acupuncture plus physiotherapy in people with subacromial impingement. [92] The RCT found no significant difference between groups in terms of composite shoulder scores. Categorisation unchanged (Unknown effectiveness) as all RCTs added had weak methods.

Manipulation under anaesthesia Existing evidence re-evaluated. Categorisation changed from Likely to be beneficial to Unknown effectiveness.

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TABLE	GRADE evaluation of interventions for shoulder pain

Important outcomes	Symptom improvement, adverse effects								
Number of studies (participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size	GRADE	Comment
What are the effects of oral drug treatment in people with shoulder pain?									
2 (78) [30] [31]	Symptom improvement	Oral corticosteroids v placebo in people with glenohumeral joint disease	4	−2	−1	−1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Consistency point deducted for inconsistent results depending on time frame. Directness point deducted for no between group comparisons in 1 RCT
1 (40) [32]	Symptom improvement	Oral corticosteroids plus home exercises v home exercises alone in people with glenohumeral joint disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for inclusion of co-interventions (analgesics, diazepam)
1 (30) [33]	Symptom improvement	Oral corticosteroids plus MUA plus intra-articular injection of corticosteroid v MUA plus intra-articular injection of corticosteroid alone in people with glenohumeral joint disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for unclear subjective outcome (dramatic response to treatment)
1 (28) [34]	Symptom improvement	Oral corticosteroids plus physiotherapy v intra-articular injection of corticosteroids plus physiotherapy in people with glenohumeral joint disease	4	−2	0	−2	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness points deducted for co-interventions (ice and hot packs) and short-term follow-up (3 weeks)
4 (463) [35] [36] [37]	Symptom improvement	Oral NSAIDs v placebo in people with rotator cuff disease	4	−1	0	−2	0	Very low	Quality point deducted for incomplete reporting of results. Directness points deducted for use of subjective outcome in 1 RCT and short follow-up (4 weeks)
What are the effects of local injections in people with shoulder pain?									
3 (167) [40] [41] [42]	Symptom improvement	Suprascapular nerve block v placebo in people with glenohumeral disease	4	−3	0	−2	0	Very low	Quality points deducted for sparse data, incomplete reporting of results, and no intention-to-treat analysis/poor follow-up in 1 RCT. Directness points deducted for unclear generalisability in 1 RCT and use of composite outcome
2 (173) [43] [44]	Symptom improvement	Intra-articular corticosteroid injection v placebo in people with glenohumeral joint disease	4	−2	0	−2	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness points deducted for composite outcome in 1 RCT and inclusion of co-intervention (physiotherapy) in analysis
1 (48) [46]	Symptom improvement	Intra-articular corticosteroid injection plus lidocaine v lidocaine in people with glenohumeral joint disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for small number of comparators
2 (fewer than 200) [43] [47]	Symptom improvement	Intra-articular corticosteroid injection v physiotherapy in people with glenohumeral joint disease	4	−2	0	−1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for use of subjective/composite outcomes

Important outcomes	Symptom improvement, adverse effects								
Number of studies (participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size	GRADE	Comment
1 (53) [48]	Symptom improvement	Intra-articular corticosteroid injection plus physiotherapy v manipulation under anaesthesia plus physiotherapy in people with glenohumeral joint disease	4	−2	0	−1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for use of composite outcome
1 (24) [45]	Symptom improvement	Intra-articular corticosteroid injection plus lidocaine v placebo in people with rotator cuff disease	4	−2	0	−2	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for unclear outcome (treatment success) and short follow-up (4 weeks)
1 (207) [55]	Symptom improvement	Subacromial corticosteroid injection plus lidocaine v physiotherapy in people with non-specific shoulder pain	4	0	0	−2	0	Low	Quality point deducted for incomplete reporting of results. Directness point deducted for use of composite outcome (repeat consultation or other intervention)
5 (254) [45] [59]	Symptom improvement	Subacromial corticosteroid injections plus lidocaine v lidocaine in people with rotator cuff disease	4	−1	−1	−1	0	Very low	Quality point deducted for incomplete reporting of results. Consistency point deducted for conflicting results. Directness point deducted for use of composite outcomes
1 (98) [60]	Symptom improvement	Subacromial corticosteroid injections plus bupivacaine v bupivacaine in people with rotator cuff disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for small number of comparators
1 (40) [62]	Symptom improvement	Open subacromial decompression plus platelet-rich plasma injection v open subacromial decompression alone in people with rotator cuff disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for small number of comparators
What are the effects of non-drug treatment in people with shoulder pain?									
4 (361) [63] [64] [65] [66]	Symptom improvement	ESWT v placebo in people with rotator cuff disease (calcific tendonitis)	4	−2	0	−1	0	Very low	Quality points deducted for poor follow-up and no intention-to-treat analysis in 1 RCT. Directness point deducted for use of composite outcomes
2 (112) [67] [68]	Symptom improvement	ESWT v sham treatment in people with rotator cuff disease (non-calcific rotator cuff tendinopathy)	4	−2	0	−1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for small number of comparators
1 (63) [69]	Symptom improvement	Laser treatment v placebo in people with glenohumeral joint disease	4	−2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
4 (170) [72] [73] [74] [71]	Symptom improvement	Laser treatment v placebo in people with rotator cuff disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for unclear outcome (recovery rates)
1 (70) [76]	Symptom improvement	Laser treatment v ultrasound in people with rotator cuff disease	4	−1	0	−2	0	Very low	Quality point deducted for sparse data. Directness points deducted for composite outcomes and short follow-up (2 weeks)
1 (66) [70]	Symptom improvement	Physiotherapy v no treatment in people with non-specific shoulder pain	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for short follow-up
2 (122) [70] [44]	Symptom improvement	Physiotherapy v placebo or no treatment in people with glenohumeral disease	4	−3	0	0	0	Very low	Quality points deducted for sparse data, incomplete reporting of results, and indirect statistical analysis between groups in 1 RCT

Important outcomes

Symptom improvement, adverse effects

Number of studies (participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size	GRADE	Comment
2 (185) [70] [79]	Symptom improvement	Physiotherapy v placebo or no treatment in people with rotator cuff disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for use of composite outcomes
1 (180) [70]	Symptom improvement	Electrical stimulation v sham electrical stimulation in people with non-specific shoulder pain	4	−2	0	−1	0	Very low	Quality points deducted for sparse data and no intention-to-treat analysis. Directness point deducted for unclear outcome (large improvement)
2 (89) [70]	Symptom improvement	Electrical stimulation v sham electrical stimulation in people with rotator cuff disease	4	−2	0	−2	0	Very low	Quality points deducted for sparse data and incomplete reporting. Directness points deducted for unclear outcome and small number of comparators
1 (42) [78]	Symptom improvement	Ice v other treatments or no treatment in people with glenohumeral joint disease	4	−2	0	−1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for small number of comparators
2 (unclear, fewer than 200) [84] [85]	Symptom improvement	Ultrasound v placebo or no treatment in people with non-specific shoulder pain	4	−2	0	−1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for unclear subjective outcome (very large improvement)
1 (49) [86]	Symptom improvement	Ultrasound plus physiotherapy v placebo plus physiotherapy in people with glenohumeral disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for use of composite outcome
3 (184) [87] [88] [89]	Symptom improvement	Ultrasound v placebo or no treatment in people with rotator cuff disease	4	−2	0	−2	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for unclear intervention (no details of ultrasound reported) and unclear outcome (treatment success)
1 (38) [54]	Symptom improvement	Ultrasound plus physiotherapy v placebo plus physiotherapy in people with rotator cuff disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for short follow-up (15 days)
1 (24) [91]	Symptom improvement	Ultrasound v acupuncture in people with rotator cuff disease	4	−3	0	0	0	Very low	Quality point deducted for sparse data, inadequate allocation concealment, and unclear intervention (no details reported of ultrasound)
1 (85) [92]	Symptom improvement	Ultrasound plus physiotherapy v acupuncture plus physiotherapy in people with rotator cuff disease	4	−2	0	−1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for use of co-interventions
2 (172) [91] [94]	Symptom improvement	Acupuncture v placebo in people with non-specific shoulder pain	4	−3	0	−1	0	Very low	Quality point deducted for sparse data, weak methods in 1 RCT, and no intention-to-treat analysis in 1 RCT. Directness point deducted for variation of intervention in 1 RCT (positive and negative setting)
1 (24) [91]	Symptom improvement	Acupuncture v placebo in people with rotator cuff disease	4	−2	0	−1	0	Very low	Quality points deducted for sparse data and weak methods (inadequate allocation concealment). Directness point deducted for short follow-up (4 weeks)

What are the effects of surgical treatment in people with shoulder pain?

Important outcomes	Symptom improvement, adverse effects								
Number of studies (participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size	GRADE	Comment
1 (30) [95]	Symptom improvement	Manipulation plus intra-articular hydrocortisone injection v intra-articular hydrocortisone injection alone in people with glenohumeral joint disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for small number of comparators
1 (fewer than 125) [80]	Symptom improvement	Surgical arthroscopic decompression v sham laser in people with rotator cuff disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for composite outcome
1 (fewer than 125) [80]	Symptom improvement	Surgical arthroscopic decompression v physiotherapy in people with rotator cuff disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for composite outcome
2 (173) [98] [99]	Symptom improvement	Arthroscopic rotator cuff repair plus arthroscopic subacromial decompression v rotator cuff repair without arthroscopic subacromial decompression in people with rotator cuff disease	4	−1	0	−1	0	Low	Quality point deducted for sparse data. Directness point deducted for use of composite outcome

Type of evidence: 4 = RCT. ESWT, Extracorporeal shock wave treatment; MUA, manipulation under anaesthesia
Consistency: similarity of results across studies
Directness: generalisability of population or outcomes
Effect size: based on relative risk or odds ratio